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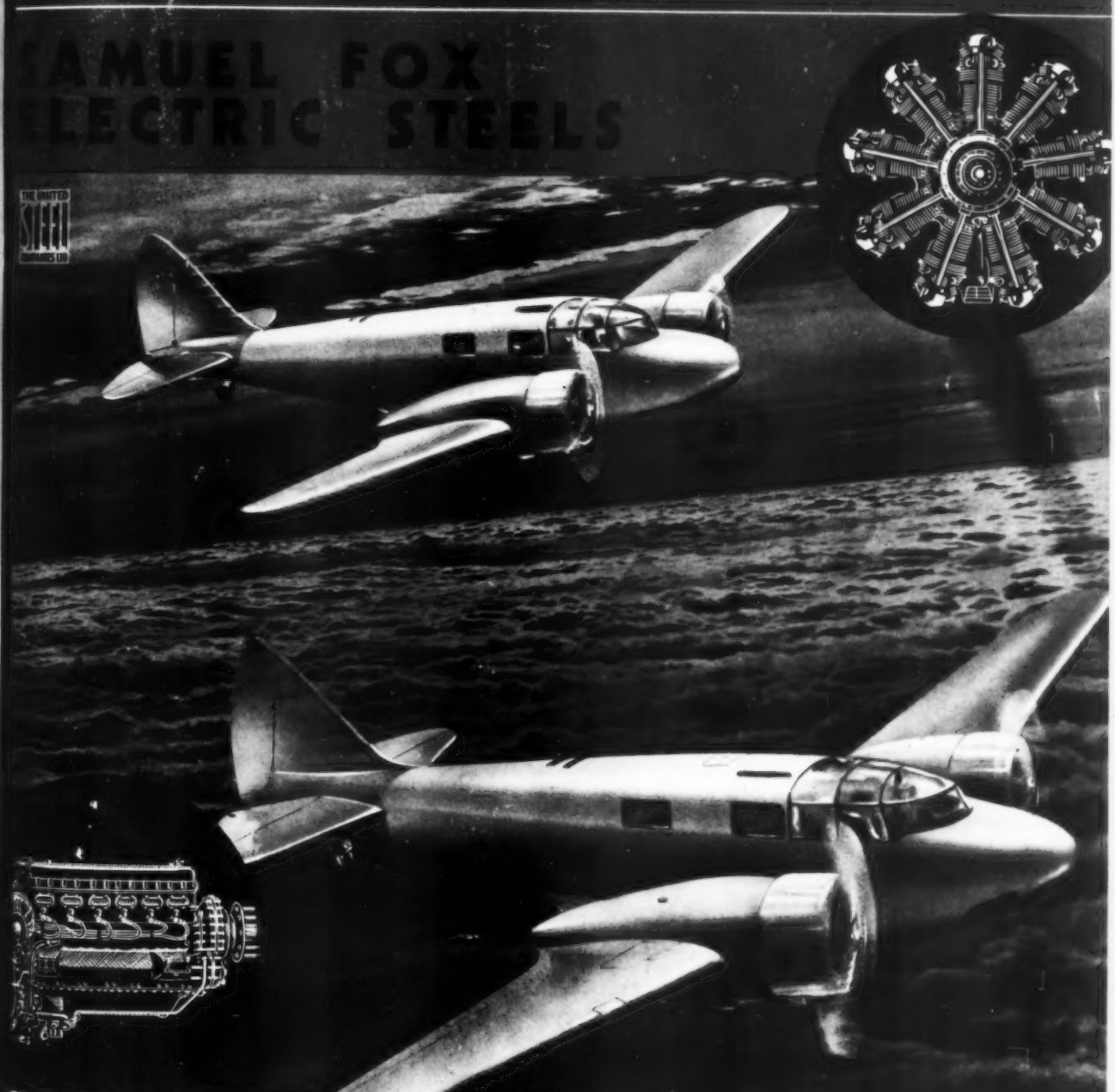

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The Outlook

Debating the Estimates

AFTER reading the Official Report of the Debate on the 1939 Air Estimates one cannot help wondering whether, for some obscure psychological reason, the amount of nonsense talked by Hon. Members is in inverse proportion to the sums being voted. In the old days more unadulterated balderdash was spoken during the debates of the Air Estimates than at any other time of the year. This year, when the Air Estimates reach astronomical figures, scarcely a single Member said anything which had not at least a modicum of sound sense behind it. And many added really valuable suggestions and comment.

The Under-Secretary of State for Air was not altogether at his best when he replied to last Thursday's debate. For instance, when dealing with the subject of high-frequency radio beacons he rather reminded one of the little boy by the brook who was asked by a passer-by how many fish he had caught. The boy's reply was, "When I have caught the one that is nibbling now, and one more, I shall have two." Capt. Balfour said: "There is a high-frequency beacon to be put at Ringway; there is to be another at Doncaster, and yet another at Belfast. We are purchasing nine further beacons to be placed at other suitable aerodromes, and this makes 15 out of a total of 19 visualised by the Maybury Committee." In other words, the Air Ministry has only actually caught three of these particular tiddlers.

Lt. Cdr. Fletcher spent a great deal of time in washing the dirty linen of the Directorate of Civil Aviation in connection with the "Mr. B." mentioned in the Rae Committee's report. His complaints and allegations may or may not be justified. But whether they were or not, the treatment of two civil servants seems of comparatively minor importance when the country's air defences are being discussed.

Rear-Admiral Sir Murray Sueter argued at considerable length that Farnborough should get out some scheme for ensuring that in case of trouble the undercarriage of an aeroplane would come into the "down" position. He pointed out that gun circuits in ships are duplicated. It was a pity that no one had informed the gallant admiral that in military aircraft not only duplication but triplication is demanded.

Lt. Col. Moore-Brabazon got a laugh by paraphrasing a remark of ours. He pointed out to the Air Minister that 50 times nothing is still nothing, and even 50 times 1 is only 50. We said something very like that many weeks ago in commenting on certain statements made by Sir Kingsley Wood.

The Expeditionary Force

MR. HORE-BELISHA, Secretary of State for War, gave great satisfaction to everybody, except to those who want to see Britain weak, when he announced in his speech on the Army Estimates that in the event of a European war the British Army would send nineteen divisions overseas. This announcement has had a noticeably pacifying effect on the world position.

There is to be no limited liability when Britain is forced to go to war. Navy, Army and Air Force will all exert their full strength in the effort to achieve victory for ourselves and our allies. Mr. Hore-Belisha had much to say about the provision of tanks, guns and battle dress for the expeditionary force. He did not, however, say anything about the air element in the force. Being War Minister and not Air Minister, it was presumably

THE OUTLOOK (CONTINUED)

outside his province to say anything about aeroplanes for the Army.

None the less, the Army cannot fight without aircraft. We may, we hope, take it for granted that in due course an army co-operation squadron or more will be provided for each division of the expeditionary force of the Army. The Air Estimates give no information on that subject because the squadrons allotted for reconnaissance for the Army do not figure as a separate entity, as the Fleet Air Arm has always done, but are buried, most confusingly, in the misleading term "Metropolitan Air Force." As we have remarked many times in the past, these squadrons add nothing to the air defence of the Metropolis or of any other part of the homeland, as they must go overseas when the Army leaves the country. Still, we may take it that the nineteen divisions will receive the approved number of reconnaissance squadrons sooner or later.

Reconnaissance Not Enough

TO provide aircraft which can reconnoitre and spot for the guns is not enough. As Group Capt. A. J. Capel pointed out in his lecture to the Royal United Service Institution last month, the expeditionary force must have bombers to carry out long or strategic reconnaissance, as well as fighters to defend the close-reconnaissance machines, and he gave it as his opinion that without that complement the Army would be unable to proceed overseas. We have not the slightest doubt that on that point Group Capt. Capel was quite right.

Now, if our Army were intended only to take part in the defence of our shores, it might be easy enough to find the necessary bombers and fighters without seriously crippling the defensive and counter-offensive policy of the Air Force. Even if the expeditionary force were to consist of only six regular divisions, the difficulties of providing them with enough aircraft might, with an effort, be overcome—even though that effort entailed departmental wrangling and perhaps increased danger to London. But to equip nineteen divisions with reconnaissance machines, bombers and fighters, all in adequate numbers, is a task of considerable dimensions, and we should very much like to know that this matter is being tackled with energy. Perhaps some Member of Parliament will question the Government on the subject.

Sitting on the Slipstream

LAST August *Flight* described and commented on the Crouch-Bolas system of getting extra lift, better take-off and slower landings by making use of the airscrew slipsteam. We pointed out that these advantages could be obtained without any material sacrifices in cruising speed. In the meantime Mr. Harold Bolas (who has now returned to this country) and Capt. Goodman Crouch have not been idle, and some interesting developments may be expected in the near future.

And now comes, from France, a very startling confirmation of the Crouch-Bolas theories. A Yugoslav engineer, working at the St. Cyr Institute under M. Toussaint, has carried out extensive wind-tunnel tests from which it appears that not only should it be possible, as the two British inventors claim, to improve take-off and landing, but to take off *en hélicoptère*, hover, and land at no forward speed!

The researches undertaken at St. Cyr by M. Svetopolk Pivko were very thorough, as will be gathered from the fact that 3,912 tests were run, with 652 different relative positions and angles of airscrews and wing. A full account of the results are published in the "Scientific and Technical Publications" of the French Air Ministry, and a summary is given in a recent issue of our French contemporary, *Les Ailes*.

Like Messrs. Crouch and Bolas, M. Pivko has found that the negative inclination of the airscrews is important. Furthermore, he has determined that the best position of the airscrews is some distance ahead of the leading edge of the wing, and about one-quarter of the airscrew diameter above the leading edge. As was to be expected, the effect is most marked when the airscrews are of as large diameter as possible, and of small pitch. However, it is not, apparently, necessary for the airscrews to "cover" the entire wing span in order to get really remarkable results. For minimum drag it was found best to have the airscrews fairly close to the leading edge. Rolling tests indicated that airscrews rotating in opposite directions might be essential for stability and controllability.

Practical Application

IN view of the work being done in this country by Crouch and Bolas, it is of interest to note that as a result of the French experiments it is estimated that even the orthodox type of aircraft could benefit materially from the tilted airscrews. Thus without any other change than the angle and position of the thrust lines of the Potez-63, a military aeroplane of 8,000 lb. gross weight and 1,300 h.p., the take-off run would be reduced by 10 per cent.

Out of curiosity M. Pivko has calculated that if the Potez-63 were fitted with airscrews of 13ft. 9in. diameter it would be able to ascend vertically (without take-off run) at 3.6 ft. per sec. In practice the undercarriage and tail-wheel would, of course, have to be modified for the greater energy which might have to be absorbed if the pilot did not make quite a perfect landing.

The French research work has gone even farther than this and has examined the results theoretically obtainable with an aircraft specially designed. Such an aeroplane would be of perfectly normal appearance, and in high-speed flight would not differ from the orthodox. It would have two extra controls: one for changing the angle of engines and/or airscrew shafts, and one for certain control surfaces on the wing, in the slipstream behind the engines. Given these extras, and the larger airscrews capable of being set to a very fine pitch, it has been calculated that a machine, the sketch design of which has been got out, weighing 3,200 lb. and equipped with two engines, running in opposite directions, of 300 h.p. each, could rise vertically, hover, fly extremely slowly or up to 180 m.p.h., and land vertically.

By "going the whole hog" in this way, helicopter performances seem to be possible. The obvious snag is that if one engine stops, or even falters, while the machine is close to the ground, serious trouble might result, as the lift and controllability are so absolutely dependent upon the slipstreams. Nevertheless, the idea does appear to call for extensive research in this country. And anyway, as two Englishmen invented the idea, we cannot in all decency ignore its development.

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Some Data on—

FOREIGN AIRCRAFT CARRIERS

The Equipment of Other Countries : Japan's Bid for Parity with America

By H. J. C. HARPER,
A.M.Inst.C.E., A.F.R.Ae.S.

BRITAIN'S AIRCRAFT CARRIERS

	Tonnage	Length
Courageous ...	22,500	786ft. 3in.
Glorious	22,500	786ft. 3in.
Furious.....	22,450	786ft. 6in.
Eagle	22,600	667ft. 6in.
Hermes.....	10,850	599ft. 6in.
Ark Royal	22,000	800ft. (approx.)
Illustrious*	22,000	—
Victorious*	22,000	—
Formidable* ...	22,600	—
Indomitable* ...	22,600	—

* Building (a further carrier, un-named, is also on order).

H.M.S. *Argus* is now used as a "parent ship" for Queen Bee target aircraft.

The seaplane carrier *Albatross* (4,800 tons) has been taken over from the Royal Australian Navy.

Two vast aircraft carriers of the U.S. Navy, the *Saratoga* and the *Lexington* (each of 33,000 tons displacement) seen from the deck of the equally famous *Ranger*

AN increasing amount of attention is being paid by the navies of the world to aircraft carriers. Many new ships of this type are coming into commission or are building. The earlier carriers were practically all conversions from battleships, battle-cruisers or cruisers which were surplus under the tonnage restrictions laid down in the Washington Treaty. As the new carriers have been designed from the outset as such they do not suffer from the same handicaps as did the conversions, and it has been possible to incorporate in their design the results of the experience gained in operating the earlier carriers.

The London Treaty defines an aircraft carrier as any surface vessel of war, whatever its displacement, designed for the specific and exclusive purpose of carrying aircraft, and so constructed that aircraft can be launched therefrom and landed thereon. By this definition those vessels which are fitted out so that aircraft can be flown-off but not landed-on are now termed "seaplane carriers," since the aircraft used must be of that description.

By the terms of the Washington Treaty, Great Britain and the United States may each have a total tonnage of carriers of 135,000, Japan 81,000, and France and Italy 60,000 each. The calibre of guns mounted must not exceed 6.1in., and the displacement of each individual ship must not exceed 27,000 tons except in the case of certain agreed conversions. In the same treaty it is laid down that all carrier tonnage in existence or building on November 12, 1921, is considered experimental, and can be replaced within the total tonnage limit without regard to age. The *Argus*, *Hermes*, *Eagle* and *Furious*, of Great Britain; the *Langley*, of the United States; and the *Hosho*, of Japan, fall within this category. Carriers commenced after that date cannot be replaced until twenty years after their completion.

The United States.—It appears strange in many ways that the United States did not turn their attention to aircraft carriers until after the war, when it is recalled that it was the navy of that country which carried out the first deck flying experiments. In November, 1910, Eugene Ely flew off a temporary platform erected over the forecastle of the U.S.S. *Birmingham*. In the following January the same pilot made a successful landing on a platform 120ft. long, constructed on the after end of the U.S. cruiser *Pennsylvania*. After a short stay on board, Ely flew off and landed ashore. These experiments convinced the naval authorities that aircraft were likely to be of service to the fleet, but there was difference of opinion as to methods.

One school of thought was of the opinion that each battleship should be equipped with a platform and aeroplane. The other maintained that it would be preferable to provide a special ship devoted exclusively to aviation purposes. Nothing was done with regard to the provision of such a ship; and, owing to the obstruction to the ships' main armament caused by a bulky platform, attention was turned to the power-operated catapult which would eliminate the long launching platform. The entry of the United States into the war led to the discontinuation, for the time being, of these experiments, her naval resources being devoted mainly to anti-submarine patrol work.

The end of the war found Great Britain far ahead of other nations in the development of the aircraft carrier. The United States naval officers, having seen the progress made, returned home eager for similar developments to be made in their own navy.

The representations of these officers were such that in 1919 Congress authorised the conversion of the collier *Jupiter* into an aircraft carrier. The work was completed in 1922, and the ship was renamed *Langley*. Her flight deck is of the flush type, i.e., there is no superstructure of any kind. Its length is 625ft. and its width 65ft. Her queer appearance and her resemblance to a "prairie schooner" led to her becoming known throughout the U.S. Navy as "The Covered Wagon." The original arrester gear fitted consisted of athwartship wires with weights on the ends, similar to the system employed by Ely in 1911. A long hook suspended beneath the fuselage of the aeroplane engaged these wires and brought the machine to rest. In addition, there were fore-and-aft wires which were engaged by hooks fixed to the axle of the aeroplane with the object of keeping it on a straight course after it had landed-on. A barrier, consisting of two heavy steel cables stretched at a height of four feet at the forward end of the deck, was

provided to prevent the pilot overshooting if he missed the wires. About 40 aeroplanes are accommodated.

The *Lexington* and *Saratoga* were originally laid down as battle-cruisers, but by the terms of the Washington Treaty of 1922 their construction as such was suspended, and it was decided to complete them as aircraft carriers. Their displacement of 33,000 tons is the greatest of any carriers. A shaft horse-power of 180,000 is developed when one of these ships is at her full speed of 34 knots. The navigating and control stations, funnels and mast, are grouped in a structure, known as an "island," on the starboard side. Eight 8in. guns are mounted in turrets before and abaft the island. Twelve 5in. A.A. guns are also mounted. About 80 aeroplanes are carried, the majority of which are stowed on deck. The hangars are reserved mainly for overhauls and repairs.

On account of the huge horse-power necessary to attain their high speed, these ships are very costly to operate. It is understood that it was mainly on this consideration that the new carrier *Ranger* was designed on a displacement of only 13,800 tons. This ship, which was completed in 1934, was the first in the U.S. Navy to be designed as an aircraft carrier. Her engines, which are 53,500 h.p., give her a speed of 29 knots. Her armament is also modest, as it consists of eight 5in. guns which can be used for high-angle as well as normal-angle firing. An island on the starboard side accommodates the navigating and control staff. The funnels are farther aft on either side of the ship and may be swung down when flying is in progress. The flight deck, which is of Oregon pine, is 730ft. long and 80ft. wide. A total of about 76 aeroplanes can be carried, 54 of which are accommodated in the hangars and the remainder stowed on deck.

Modifications

Two further carriers, the *Yorktown* and the *Enterprise*, were laid down in May and July, 1934, respectively. Both are 19,900 tons displacement, 809½ft. in length and 83¾ft. beam. They mount eight 5in. A.A. guns and sixteen 1.1in. A.A. machine guns. They have a designed speed of 34 knots, and can accommodate about 100 aircraft. An interesting feature of these ships is the provision of catapults on each side on the level of the hangar deck. The *Yorktown* commenced trials at the end of September, 1937, but trouble was experienced due to excessive vibration, and serious mechanical defects involved replacement of the reduction gearing and a large number of boiler tubes. Owing to these troubles the completion of this ship was delayed until the end of last year. As the *Enterprise* was being built at the same yard to the same design, similar alterations had to be made in that carrier.

The latest American carrier, the *Wasp*, of 14,700 tons displacement, was laid down in 1936 under the 1935-36 programme. Her length is 688ft., beam 81ft., and main armament eight 5in. A.A. guns. She will have a speed of 34 knots and accommodation for 75 aircraft. It is expected that she will be ready for acceptance towards the end of this year. It is intended that this ship should replace the *Langley*. She will bring the U.S. carrier tonnage up to the 136,000 tons allowable under the Washington Treaty.

A further carrier, to be named the *Hornet*, was included in the 1938 naval programme.

It is of interest to note that in the U.S. aircraft carriers it is the common practice to stow the majority of the aircraft on the flight deck. A number of ring bolts are countersunk into the deck, and from these lashings are taken to the aeroplanes to secure them.

Landing is controlled by an officer stationed at the after end of the flight deck. If he considers the approaching aircraft to be at a height which would cause it to land too far forward, to the danger of the parked machines, he gives the negative signal and another circuit is made before attempting to alight. If the controlling officer considers the approach to be correct he signals the pilot "to cut the gun"; the machine then touches down and is rapidly brought to rest by means of the arrester wires stretched across the deck. A wire-rope crash barrier is lowered to admit it to the parking area. This method is a much quicker way of taking aircraft on board than taking each one down to the hangar as soon as it lands-on. The stowage of the aircraft on the deck for extended periods has, however, the disadvantage of exposing them to the effects of the weather.

In the case of *Lexington* and *Saratoga*, the 80 aircraft embarked are of six types: fighters, dive-bombers, scout-observation, scout-bombers, torpedo-bombers and utility aircraft. This diversity of types has been found to complicate operations very considerably, as a large number of machines may have to be moved to permit of the required squadron being ranged up.

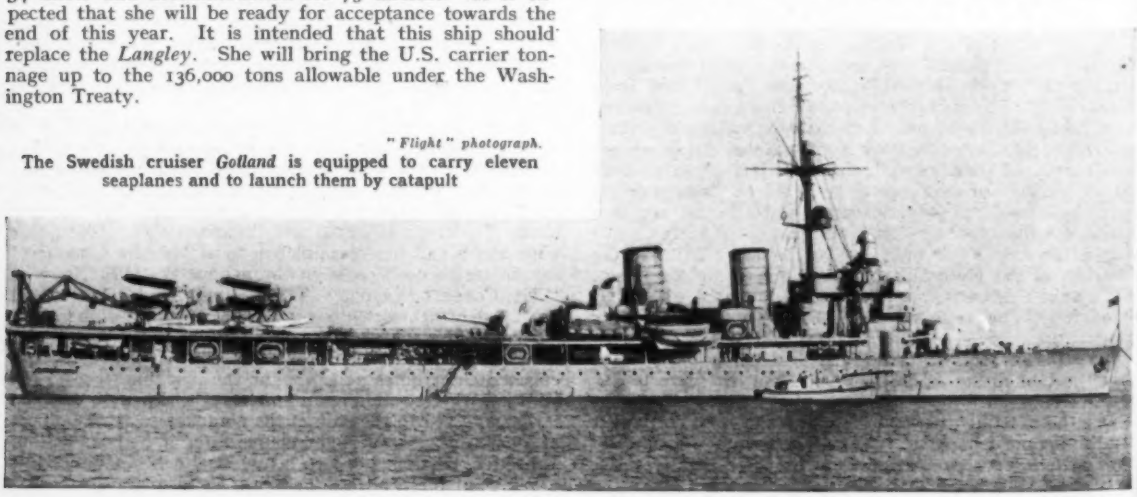
As a result of these drawbacks, the 57 aircraft operated by the *Ranger* are confined to two squadrons of fighters, one of scouts and a unit of three utility machines. These latter are amphibians, and as well as being used for hack work are available to proceed to the assistance of any of the ship-planes which may have been forced down in the sea. It is understood that *Yorktown* and *Enterprise* are being equipped with four squadrons of fighters apiece, dive-bombers, scouts and torpedo-bombers—a total of 72 aircraft.

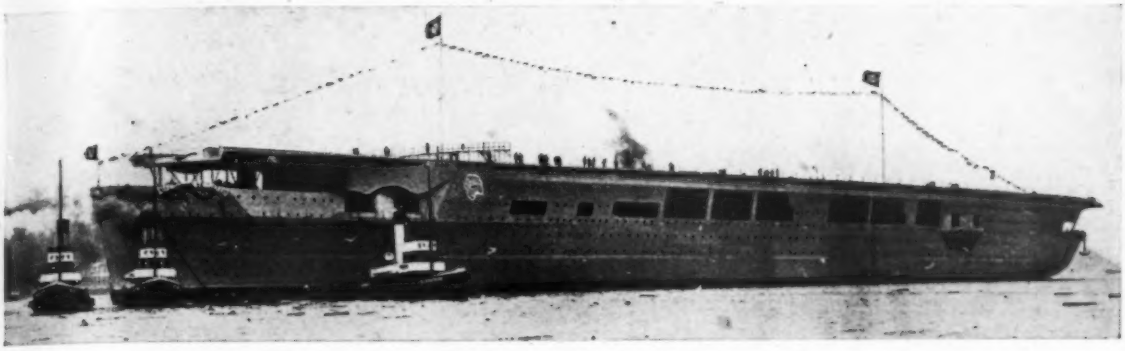
Japan.—Japan is the only other foreign Power with a considerable aircraft carrier strength. Quick to assimilate Western ideas, she turned her attention to carriers soon after the War, and a design was put in hand for a small ship of this type. This, the *Hosho*, which was completed in 1922, has a displacement of 7,470 tons, a length of 510ft. and accommodation for about 26 aeroplanes. The flight deck is of the flush type and extends the whole length of the ship. The funnels are on the starboard side and arranged to hinge down horizontally when flying is in progress. Her speed is 35 knots.

Japan's next two carriers, the *Akagi* and the *Kaga*, both of 26,900 tons displacement, were originally a battleship and a battle-cruiser respectively. These ships, as such, were surplus to the tonnage allotted to Japan by the Wash-

"*Flight*" photograph.

The Swedish cruiser *Gotland* is equipped to carry eleven seaplanes and to launch them by catapult





Germany's first aircraft carrier, the *Graf Zeppelin*, was launched recently at Kiel.

ington Treaty and consequently it was decided to convert them to aircraft carriers. The conversions were completed in 1927 and 1928 respectively. Their armament, which is even heavier than that of the U.S. ships *Lexington* and *Saratoga*, consists of ten 8in. and twelve 4.7in. guns. The flight deck, which is of the flush type, is stopped off at a considerable distance from the bows to permit of a short flying-off deck at a lower level. The *Akagi* carries 50 aircraft and the *Kaga* 60. The length of the former ship is 763ft. and that of the latter 715ft. The top speed is 28½ and 23 knots respectively. *Akagi* went into dockyard hands in 1937 for an extensive refit. An island superstructure is being added and the upper flight deck is being extended over the bows.

The *Ryuzyo*, which was completed in 1933, has a displacement of 7,100 tons and a length of 549ft. She is armed with twelve 5.1in. guns, has a speed of 25 knots and accommodates about 25 aeroplanes. The deck arrangement is similar to that of the *Akagi* and *Kaga*.

Two 10,000-ton carriers, the *Soryu* and *Hiryo*, were laid down in 1934 and 1936 respectively. They are said to have been designed to match the U.S.S. *Ranger*. The first of these ships was launched in December, 1936, and is in commission, and the second was launched in November, 1937. It is understood that they have a speed of about 30 knots and accommodation for between 60 and 70 aeroplanes. Their main armament consists of twelve 5in. A.A. guns. Length is 668½ft., and beam 68½ft.

Over the Limit

A third new carrier, the *Koryu*, was laid down in 1938. Although no particulars have been released she is understood to be similar to her two predecessors.

Without this last-named ship Japan's carrier tonnage is 88,470, which is 7,470 tons more than that allotted under the Washington Treaty. In numbers of aircraft carriers built and building she equals the United States, but her ships are generally of smaller size and capacity. They are believed to accommodate about 240 aircraft, whereas the U.S. carriers could probably operate 360.

Japanese fleet aircraft comprise two types, fighter and torpedo-bombers; the latter, which are three-seaters, can also be used for reconnaissance.

In addition to her aircraft carriers Japan has two seaplane carriers, the *Notore* and *Kamoi*, which were converted from oil tankers in 1920 and 1922 respectively.

Also, a 10,000-ton seaplane carrier, *Chitose*, was launched in November, 1936, and is in commission. A new 9,000-ton ship of this type, the *Mizuho*, was launched in May, 1938. She has a length of 572ft., a speed of 17 knots, and an armament of six 5in. A.A. guns. Another smaller ship, the *Chiyodo*, is building.

France.—The French Navy at present possesses only one aircraft carrier, the *Bearn*. She was originally a battleship and her conversion to a carrier was completed in 1928. Her displacement is 22,846 tons, length 597ft., and beam 89ft. Her main armament consists of eight 6.1in. guns and six 3in. A.A. guns. She carries about forty aircraft which comprise fighter, torpedo-bomber and short-range reconnaissance types. Her speed is low for a modern aircraft carrier—21½ knots.

Two 18,000-ton carriers were included in the French naval programme for 1938. The first of these, the *Joffre*, was laid down in November, 1938, and is due for completion in 1941. The second carrier, the *Painlevé*, is to be put in hand this year. These ships will probably have a main armament of eight 5.1in. guns and a speed of 32 knots. Accommodation for about 50-60 aircraft will be provided.

France has also the 10,000-ton seaplane carrier, *Commandant Teste*, which is fitted with four catapults and embarks about 26 seaplanes.

Germany.—Under the Anglo-German naval agreement Germany is allowed four aircraft carriers of a total tonnage of 87,000. Of this quota, two 19,250-ton carriers are at present building. The first was launched on December 8, 1938, and was named *Graf Zeppelin*. Her flight deck is 819ft. long and 88ft. wide; it is stopped off some distance short of the bow. Her armament consists of sixteen 5.9in. guns, ten 4in. A.A. guns and twenty-two 1.5in. A.A. machine guns. She is stated to have a considerable amount of armour and to be designed to have the fighting power of a cruiser. Her speed will be about 32 knots. She will have accommodation for 50 aircraft. It is understood that the two remaining carriers of the quota will not be laid down until experience has been obtained in operating the first two. As it will be about another two years before the first carrier is completed, and as it will take some time for the German Navy to acquire the technique of handling aircraft carriers it would appear that it will be very nearly five years before Germany is in a position to lay down the remaining carriers.

It has been stated in the German Press that there is no question of using these carriers in land-locked seas such as the Baltic and North Sea, over which land-based aircraft can hold sway, but that in time of war they would be used to take the offensive into the Atlantic.

Italy.—In introducing the navy estimates for 1938, Admiral Cavagnari announced that Italy intended to keep to her decision not to construct aircraft carriers. Her geographical position renders them unnecessary, as the increase in speed, range and carrying capacity of aeroplanes has diminished the usefulness of carriers in the theatres of operations most vital to Italy. It is considered that the whole of the Mediterranean is well within the range of the Italian air bases.

Italy does, however, possess one seaplane carrier, the *Miraglia*, of 4,880 tons, which is capable of carrying four large and sixteen small seaplanes.

Russia.—Russia does not possess any aircraft carriers, which is not surprising, as her navy itself can hardly be called modern. She does, however, possess a seaplane carrier, the *Krasnia Moryak*, which is based on Sevastopol. This ship has accommodation for twenty-four seaplanes of fighter and reconnaissance types.

Sweden.—Sweden has a very interesting cruiser-seaplane carrier, the *Gotland*, which visited this country in January, 1936. She can carry eleven seaplanes, which are launched by means of a catapult.

AIR ESTIMATES DEBATED

Sir Kingsley Wood Outlines Progress Made and Hints at Things to Come : Spending £250,000 a Day : £93,000,000 for Aircraft and Balloons : £5,000,000 for Research and Development

THE Secretary of State for Air, Sir Kingsley Wood, introduced the 1939 Air Estimates in the House of Commons last Thursday. He recalled that it had sometimes been said that the Air Ministry was the Cinderella of the Defence Departments. Such a statement could not be made to-day, when the Estimates reached a sum of over £205,000,000, which was the largest in the history of the Air Ministry.

This year's increase of £74,000,000 was equivalent to the total of all defence estimates in 1913. The increase was accounted for mainly under the headings of technical and warlike stores, works and buildings, and land. Approximately £93,000,000 was provided for aircraft and balloons.

Referring to the appeal which he made last June for 31,600 pilots, observers, airmen and boys, Sir Kingsley Wood said this figure had been passed the previous week. Of those obtained more than 1,400 were pilots. During the coming year a further 20,000 would be wanted. They needed particularly more air observers and wireless operators.

He recalled that during the last few months the conditions of the short-service commissions for pilots had been revised. The upper age limit had been extended from 25 to 28 years, and candidates were now given an opportunity of serving for six years on the active list and four years in the reserve, instead of four years on the active list and six years in the reserve. A similar choice was being offered to officers already in the Service. The longer period of active service would afford an opportunity of promotion to the Flight Lieutenant and would increase from £300 to £500 the gratuities payable on transfer to the reserve.

Sir Kingsley Wood said that when last he spoke on the subject of recruiting he expressed the hope that the strength of the R.A.F. in June next would be 100,000 officers and men. That number had already been almost achieved.

V.R. Progress

Turning to the subject of the R.A.F. Volunteer Reserve, the Air Minister stated that 33 Reserve centres had been formed in urban areas, and they hoped to organise over 20 more in the coming year. The men were trained in their leisure hours, but a special scheme had recently been introduced for pilots and air crews so that when they had attained a certain degree of experience they could undergo continuous training up to six months at R.A.F. stations. In an emergency these men would be able to take their places in Service Squadrons without further intensive training. Recently it had been decided to extend the R.A.F. Volunteer Reserve flying training organisation overseas, and they hoped it would be possible to form sections in Malaya, Hong Kong and East Africa. An important development had been the introduction of a new scheme of entry into Class E of the Reserve for pensioners and ex-airmen who had served in the regular force. From July, when the scheme was launched, until November, 2,300 had been enlisted, and this number had been more than doubled since November.

Dealing with the Auxiliary Air Force, Sir Kingsley Wood said that they would need some 2,000 officers and airmen during the coming year.

Of the balloon barrage Sir Kingsley Wood said the first ten units formed in the London area were now practically up to establishment, and the barrage in London was now operable should occasion demand it. In other parts of the country the balloon defences were being actively organised and recruiting was proceeding well at most centres. He hoped all the balloon barrages would be operable by the end of the year.

The Air Minister then referred to the Air Defence Cadet Corps and the assistance to gliding clubs. Of the Civil Air Guard scheme, Sir Kingsley Wood said the Guard at present numbered some 1,400 members holding "A" licences and 3,800 were undergoing flying training. It had recently been decided to organise the Guard for service in case of emergency by classifying "A" licence holders into three groups. The first two comprised those who could serve as pilots, instructors, observers, wireless operators and air gunners. The third comprised men and women who might be suitable as ferry pilots, ambulance pilots and for general communication duties.

On the subject of training the Air Minister said that in spite of the greater number of pilots needed the individual standard of airmanship was higher than ever before. Special training schools would be formed where pilots and air crews from the flying training schools would be given operational training on Service types. Members of the Volunteer Reserve would also attend these schools. Flying training for the Volunteer Reserve was already being carried out at 32 centres and would be in progress at more than 50 in the coming year.

Referring to the considerable number of accidents which, unfortunately, occurred, Sir Kingsley Wood said that the increase during the last year was due to the increase in the number of flying hours. There was no increase in the number of accidents in relation to the hours flown. Nevertheless, they were watching very carefully and making investigations to discover whether there were any causes leading to accidents which were preventable. To supplement the investigations conducted by the Inspector of Accidents, he had recently asked the Inspector-General of the R.A.F., in conjunction with a Committee representing the Departments of the Air Ministry concerned and the Central Flying School, to review the whole accident position from the broadest point of view. A Committee was being formed to investigate and advise on the medical aspects of all matters concerned with flying personnel. Sir Edward Mellanby had been appointed Chairman of the Committee.

Turning to the subject of expansion Sir Kingsley Wood said that by April 1st, the date on which the programme was to have been completed, the number of first-line aircraft at home would have been raised to the figure of 1,750. As regards the programme announced last May for a Metropolitan Air Force of approximately 2,370 aircraft by the end of the coming financial year, good progress had been made, and he thought there was every prospect of the programme being completed within the time promised. Four more squadrons had been established overseas during the year, making a total of thirty squadrons. Certain additional squadrons would be formed in accordance with the programme already announced for increasing the overseas strength to approximately 500 first-line aircraft.

Sir Kingsley Wood then explained at some length that he had been misunderstood last November when he referred to the increasing attention being given to the production of fighters. They had not abandoned our traditional reliance on the counter-offensive.

Considerable progress had been made in the transfer of the administrative control of the Fleet Air Arm from the Air Ministry to the Admiralty. He hoped it would be possible to complete the transfer early in the coming financial year.

Research

Sir Kingsley Wood said he personally attached very great importance to research and development work and pointed out that the air estimates included an increase in provision totalling some £5,000,000 on this account. The Air Minister also referred to the reorganisation of the Technical Departments in the Air Ministry and recalled that a number of new directorates had been formed.

When dealing with the subject of production, Sir Kingsley Wood said the eleven factories established under the shadow scheme were now in production, as was also the new Government factory for producing carburetters under the management of the Standard Motor Co.

Referring to the new group scheme, the Air Minister said:—"I would like to refer to the arrangements which have now been made for a new and very important development in the organisation of aircraft production for the R.A.F. This group scheme, as I might call it, has the double object of reducing the number of designs in service and facilitating economical and rapid quantity production. It is an extension of the present practice under which aircraft of the same type are manufactured by more than one firm. Under the new scheme, three or four firms will be formed into a group, and orders will be placed for the manufacture of one type of aircraft to be distributed between the firms in that group. The organisation of the aircraft industry on this basis will, I think, facilitate large-scale planning and ordering, and it will have the advantage of lessening the volume of technical work through all stages of design, development and inspection, and of simplifying training, maintenance, storeholding and equipment throughout the

Service. It will also—and this is important—reduce the dislocation that might result in war time if for any reason one of the manufacturing units was unable to continue in production. The scheme is being brought into operation with the full co-operation of the firms concerned, and it will not embrace only the firms in the aircraft industry, but the Government factories and the new factories which are being created by such firms as Metropolitan-Vickers."

On the question of labour, the Air Minister said that excluding the large number of persons employed on sub-contracts, the labour forces of the industry had increased by 40 per cent. during the last six months. He recalled that the Air Ministry had pursued the policy of taking the work to places where labour was available and of encouraging sub-contracting. Recently they had endeavoured to encourage firms in Scotland to take on sub-contract work.

Of the vexed question of modifications Sir Kingsley Wood said that while maintaining safety as a paramount consideration the Air Ministry had endeavoured to reduce the number of modifications made during production. In addition to appointing serving R.A.F. officers as overseers in contractors' works, they had instituted at each contractor's works a local modifications committee, presided over by the overseers and including Air Ministry representatives and representatives of the firm. The object was further simplification and the ability to make decisions early. Jigging and tooling of types in the present programme had also been launched on a considerable scale and considerable assistance had been rendered by the Supply Committee.

When discussing aircraft production Sir Kingsley Wood said that although he could not give actual figures the vast sums that were being spent gave tangible evidence of the efforts we were making. At present we were spending a quarter of a million pounds every day on the production of aircraft alone and that figure would rise still further. Last November he had said that the output of aircraft in May of this year would show an increase of 150 per cent. compared with the output in May of the previous year. He was glad to say that the estimate had proved conservative and the 150 per cent. increase had been achieved already. He hoped that by May of next year the output would show a 400 per cent. increase over May, 1938.

Dealing with profits made in aircraft production the Air Minister said that as more experience and data were now available he had given instructions for a special investigation to be made to see whether any revision of the present system were desirable. He explained that the relations between the Air Ministry and the aircraft firms were governed by the McLintock agreement negotiated in the spring of 1936, but not finally ratified until last year. The departmental investigation had shown that, while the agreement might have been adapted to the conditions obtaining when it was negotiated, some modification of its terms were now desirable. Conditions had been changed by the enormous increase in the number of orders and the consequent expansion of straight-run production. He had at once got in touch with representatives of the industry who had shown every readiness to meet him and to arrive at reasonable conclusions. He had invited Sir William McLintock to undertake an immediate review of the agreement.

Turning to the subject of civil aviation, Sir Kingsley Wood thought they were embarking on a larger plan of civil air routes and a greater State expenditure. It was essential they should do this if they were to secure an adequate share in the development of the vital communications upon which the Empire largely depended. It was for this reason that the estimates included this year a sum of £4,700,000 for civil aviation. Six years ago aircraft employed on regular transport throughout the world flew 100,000,000 miles on a route network totalling 200,000 miles. It was calculated that in the current year the distance flown by aircraft would be nearer 250,000,000 miles. Six years ago aircraft operated by United Kingdom companies on regular air services flew 2,500,000 miles, and carried 79,000 passengers. In the current year the mileage would be nearer 11,000,000 miles and the number of passengers would probably exceed 250,000. Six years ago 170 tons of mail were carried in a year by British commercial aviation. Last year over 2,000 tons were carried in this way and nearly 600 tons of letter mail on the internal air services; nearly 750 tons on the European services; nearly 850 tons on Empire services and a small tonnage on other extra European services. At the end of 1938 the Empire route mileage was about 88,000.

[*Considerations of space preclude publication of some speeches which followed Sir Kingsley Wood's; we hope to give them some prominence next week.*—ED.]

The Delta Flies

PILOTED by Capt. A. N. Kingwill, the Willoughby Delta 8 *St. Francis* made its first test flight last Saturday. After about ten minutes' ground-handling Capt. Kingwill took off, made a circuit of Witney aerodrome, where the machine was built, and flew across to Brize Norton, where he made a perfect landing. Minor adjustments of the tail setting are to be made, and then the test flights will be continued. The *St. Francis* was described and illustrated in *Flight* of February, 9, 1939.

A New Met. Instrument

IT may be recalled that in *Flight* of August 4, 1938, there was described in some detail the Fox cloud-base predictor, evolved by Mr. J. S. Fox, the well-known sailplane pilot. The instrument is now in production by Negretti and Zambra, of 38, Holborn Viaduct, London, E.C.1.

Briefly, to recapitulate its features, the predictor consists, in essentials, of a wet and dry bulb hygrometer and a rotatable drum chart arranged to be read off against the former.

The drum is set to a position at which a temperature scale round its base coincides with the reading of the dry-bulb temperature. The lines on the chart, read off against the height of the mercury in the wet-bulb thermometer, then give a direct indication of the cloud-base height.

The predictor relies on the characteristic behaviour of rising air currents, which usually condense into cloud. Whereas it was expected to function accurately only on days when strong up-currents were present, the instrument has been found reliable in almost all conditions, even when cloud condensation is caused by the weakest of rising currents.

In addition to indicating cloud-base height up to 7,000ft., the predictor will forecast possible clouding-over of a clear sky and will also indicate the presence of an inversion, with the bumpy flying conditions which it implies.

The price of the instrument is £3 15s.

Wanted—to Command Cadets

MR. H. R. GILLMAN, of the S.B.A.C. (32, Savile Row, London, W.1), is anxious to find an ex-R.A.F. officer to volunteer for the command of an Air Cadet Squadron which he is helping to organise at a school in the Crystal Palace district.

Forthcoming Events

MARCH.

Thurs.,	16th.	R.Ae.S. Lecture*: "Relative Merits of Carburetters and Direct Petrol Injection," by J. E. Ellor, F.R.Ae.S., and F.M.Owner, F.R.Ae.A.
Thurs.,	30th.	R.Ae.S. Lecture: "The Problem of Ancillary Power Services on Aircraft," by R. H. Chaplin, B.Sc., A.F.R.Ae.S., and F. Nixon, B.Sc., R.Ae.S.

APRIL.

Sat.,	15th.	Opening of West Hartlepool Airport by the Secretary of State for Air.
Thurs.,	20th.	R.Ae.S. Lecture*: "Possible Steel Developments," by Dr. T. Swinden, F.R.Ae.S.
Fri.,	21st.	Norfolk and Norwich Aero Club: Annual Dinner and Dance.

MAY.

Thurs.,	4th.	R.Ae.S. Lecture*: "Strength of Thin Metal Construction," by H. L. Cox.
Sun.,	14th.	R.Ae.S. Garden Party, Fairey's Great West Aerodrome.
Sat.,	20th.	Empire Air Day.
Thurs.,	25th.	R.Ae.S.: Wilbur Wright Memorial Lecture by Dr. G. W. Lewis.
Sat.,	27th.	London-I.O.M. Race.
Mon.,	29th.	Manx Air Derby and Tynwald Race.

JUNE.

Sat.,	24th.	Royal Air Force Garden Party.

JULY.

Sat.,	8th-Sun., 23rd.	Brussels Aero Show.
Sat.,	29th-Sun., 30th.	Frankfurt International Flying Meeting.

* All these lectures take place at 6.30 p.m. at the Institution of Mechanical Engineers, Storey's Gate, London, S.W.1.

THE ROYAL AERO CLUB

News and Official Notices for the Week Ended March 11

Race Rush

WIDESPREAD interest has been aroused by the announcement in last week's Royal Aero Club Notes of the decision of the Club to organise, this year, a new race for light aeroplanes of the class built specially for training C.A.G. pilots.

The present indications are that this race will draw a record number of entries for its class. Those thinking of taking part in the contest are reminded that a resumé of the requirements will be published in these Notes as soon as the rules are finally settled. It may be said now, however, that the race will be open to aircraft with engines not exceeding 150 h.p., and that, as mentioned last week, foreign engines will be allowed this year, though the airframes must be of British manufacture.

Certificates Soar

STATISTICS covering the whole of 1938 show that the total number of Royal Aero Club Aviators' Certificates issued exceeded the number for the previous year by nearly 200. The figure for 1938 was 1,172, and it included the record of 196 in one month. Increases have been mainly concentrated at the latter months of the year and reflect the effects of the introduction of the C.A.G. For the present year the indications are that a total of between 3,000 and 4,000 new certificates may be obtained.

Air Defence Cadets and Gliding

REPORTS which reached the British Gliding Association this week confirm that the gliding clubs will easily be able to undertake the training of the 700 Air Defence Corps Cadets provided for under the new Government gliding subsidy scheme. Individual clubs calculate that they will be able to train up to as many as 240—to quote one instance—and the average figure is above 50.

It will be recalled that the Cadets are to be trained by the gliding clubs at 14-day camps in various parts of the country. This is substantially the scheme originally put up to the Air Ministry by the B.G.A. and reported at the time in these Notes.

A preliminary meeting between the representatives of the B.G.A. and of the Air Defence Cadet Corps was held at the Royal Aero Club on Friday, March 10.

In view of the present state of development and location of the Air Defence Cadet Squadrons and in order to keep down travelling expenses, a provisional agreement was reached that the clubs undertaking Air Defence Cadet camps during the summer of 1939 would be Southdown, Surrey, London, Cambridge, Oxford, Midland, Derbyshire and Lancashire, Yorkshire, Scottish and Newcastle.

The approximate number of cadets to be trained by each club has also been provisionally agreed.

No Brollies for C.A.G.s?

REPRESENTATIVES of the General Council of Associated Light Aeroplane Clubs and of the Air Ministry have discussed whether parachutes should be supplied for advanced training of C.A.G. members. The views expressed on behalf of the clubs were against the introduction of parachutes for this training, which differs very little from ordinary club flying and would not warrant the necessary modifications to the aircraft and the expense of obtaining and maintaining parachutes.

Record Passed

MR. ALEX HENSHAW'S Capital-to-Capital record flights from London to Cape Town, and return, between February 5 and February 9, have been officially recognised by the Fédération Aéronautique Internationale as follows:—

London-Cape Town: Duration: 39 hours 25 minutes. Average speed: 244.876 km./hr. (152.1 m.p.h.).

Cape Town-London: Duration: 39 hours 36 minutes. Average speed: 243.745 km./hr. (151.4 m.p.h.).

On the Air Routes

FRANCE.—Parachute dropping exercises are being carried out at *Avignon-Pujaut* aerodrome. Right-hand circuits will be made over the aerodrome by the aircraft employed for this purpose, and a red panel is displayed on the aerodrome. Other aircraft using the aerodrome are requested to make left-hand circuits at a distance of 2 km. and not to land until the parachute-dropping aeroplane has landed.

DENMARK.—Danger Area: Gunnery practice will take place in *Köge Bay* (15 miles S.W. of Copenhagen) on March 22 and 23. Airmen are requested during the period in question not to fly above the bay at a height of less than 4,000 metres (13,124ft.).

KENYA.—In a recent *Notice to Airmen* pilots are requested to avoid unnecessary flying in the vicinity of hospitals and nursing homes in *Nairobi*.

NYASALAND.—It is notified for general information that Salima landing ground is closed until further notice.

Aviators' Certificates

No.	Name	Club or School	Date
17,231	Fred Downs	Yorkshire Aeroplane Club.	19.2.39
17,232	Charles William Walker	London Air Park Flying Club.	25.2.39
17,233	Derek Bert Thrower	Southend Flying Club	21.2.39
17,234	Vernon John Thornton	Southend Flying Club	25.2.39
17,235	Henry Leslie Bennett	Southend Flying Club	24.2.39
17,236	Mervyn Horatio Clive (Viscount)	Brooklands Flying Club	27.2.39
17,237	Frank Conway	Brooklands Flying Club	27.2.39
17,238	Douglas John Nicholls	London Aeroplane Club	1.3.39
17,239	Thomas William Phillips	Ipswich Aero Club	26.2.39
17,240	Cyril Leonard Chappell	Malling Aero Club	3.3.39
17,241	Norman Clifford Everett	Romford Flying Club	2.3.39
17,242	Norman Rogers	Weston Aero Club	25.2.39
17,243	Muriel Constance Mitchell	Portsmouth Aero Club	28.2.39
17,244	James Wollaston Boote	London Aeroplane Club	3.3.39
17,245	John Wybergh Chance	London Aeroplane Club	4.3.39
17,246	Leslie Howard Tandy Capel	Herts and Essex Aero Club	4.2.39
17,247	Benjamin Ramsden	Portsmouth Aero Club	5.3.39
17,248	Walton James Muncaster	Portsmouth Aero Club	27.2.39
17,249	Ronald Sykes	Lancashire Aero Club	16.2.39
17,250	Douglas Green	London Air Park F.C.	3.3.39
17,251	Eric Noel Capell	London Air Park F.C.	3.3.39
17,252	Alan Geoffrey Freakes	London Air Park F.C.	18.2.39
17,253	Edward Dyson Iredale	London Air Park F.C.	3.3.39
17,254	John Bovingdon Cockin	London Air Park F.C.	3.3.39
17,255	Yvonne Mary Medlicott	London Aeroplane Club	6.3.39
17,256	Rupert Alan Richardson	London Aeroplane Club	6.3.39
17,257	Peter Lavender	London Aeroplane Club	6.3.39
17,258	Francis William Hack	Kent Flying Club	22.2.39
17,259	Gordon Maitland Thompson	Tollerton Aero Club	5.2.39
17,260	Arthur John Howard	Cinque Ports Flying Club	21.2.39
17,261	Geoffrey Derek Addinsell	University Aero Club	20.2.39
17,262	Henry Samuel Conder	University Aero Club	11.2.39
17,263	Robert Ramsay Campbell Walker	University Aero Club	4.3.39
17,264	Philip Allen	University Aero Club	12.2.39
17,265	Eric Mitchell Crook	Cambridge Aero Club	24.2.39
17,266	Veronica Innes	Cambridge Aero Club	16.2.39
17,267	Harold Ernest Trillwood	Cambridge Aero Club	20.2.39
17,268	Arthur Waller	Cambridge Aero Club	15.2.39
17,269	Freydis Mary Leaf	Cambridge Aero Club	15.2.39
17,270	Donald Irving Powell	Cambridge Aero Club	4.3.39
17,271	Albert Barker	Lancashire Aero Club	7.3.39
17,272	John Simmons Hood	Scottish Flying Club	3.3.39
17,273	William John Lambie	Scottish Flying Club	6.3.39
17,274	Donald John MacLeod	Scottish Flying Club	5.3.39
17,275	Stanley Albert Jackson	Cotswold Aero Club	7.3.39
17,276	Frank Gordon Percy Shaw	Redhill Flying Club	26.2.39
17,277	Alan Francis Thomas	Redhill Flying Club	26.2.39
17,278	Bernard Grant Jackson	Airwork Flying Club	3.3.39
17,279	John Caister Cooke	Marshalls Flying School	3.2.39
17,280	Maurice Jonas Hiller	London Transport (C.B.) Sports Assn.	7.3.39
17,281	Frederick Hugh Bennet	Thanet Aero Club	9.3.39
17,282	Albert Neil Jacob	Cambridge Aero Club	4.3.39
17,283	Lionel Charles William Daisley	Cambridge Aero Club	8.1.39

To-night's R.Ae.S. Lecture

TO-NIGHT, March 16, Messrs. J. E. Ellor, F.R.Ae.S., and F. M. Owner, M.Sc., F.R.Ae.S., will read their R.Ae.S. paper entitled "A Review of the Relative Merits of Petrol Injection and Carburettors for Aero Engines."

The authors consider the merits of the two systems from the points of view of improvement in performance, simplification of operation and servicing, facilities and cheapness of production, and reliability. They conclude that such evidence as is available in connection with multi-cylinder engines indicates no improvement in either power or consumption of the petrol injection engine as compared with the carburettor system. They admit, however, that the same experience has not been obtained on petrol injection as on carburettors and the undoubted possibilities of fuel injection have yet to be developed fully.

The lecture will be given in the Lecture Hall of the Institution of Mechanical Engineers at 6.30 p.m.

SERVICE AVIATION

Royal Air Force and Official Announcements : Fleet Air Arm News : Military Aviation Abroad

Formation of Reserve Command

AS stated in the memorandum by the Secretary of State for Air which accompanied the Air Estimates, recently published, a Reserve Command has been formed. It will be responsible for the training of all sections of the Volunteer Reserve—pilots, air crews and ground personnel—and will also control the elementary flying training schools to which regular as well as reserve personnel are sent for initial instruction.

The Air Officer Commanding, Reserve Command, will be Air Marshal Christopher Lloyd Courtney, C.B., C.B.E., D.S.O., who has been appointed with effect from March 14.

A Gallant Airman Pilot

LAST Saturday a sharp fight took place in Transjordan between a band of Arab terrorists and the Transjordan Frontier Force helped by the Arab Legion. Lt. Col. Chrystal, the C.O. of the Transjordan Frontier Force, went up in an aeroplane, piloted by Sgt. John Coggins, R.A.F., to watch the course of the action. While flying low the machine was hit ten times by bullets and the pilot was wounded. Despite loss of blood, he landed safely on the ground at Jisr el Majameh, but then collapsed, and was taken to hospital in a serious condition.

Sgt. Coggins went through his elementary flying training at the Reid and Sigrist School at Desford. He was one of the seventh course there, from January 4 to March 15, 1937. He passed out as above the average, and went on to No. 4 Flying Training School at Abu Sueir. He passed out from the F.T.S. with a Special Distinction, and was posted to a squadron. A few months ago he was decorated with a Distinguished Flying Medal for gallantry in action, and he has now given a second proof of his mettle.

Committee on Medical Aspects of Flying

THE Secretary of State for Air, on the recommendation of the Director of Medical Services, Royal Air Force, has appointed a standing committee to investigate and advise him on the medical aspects of all matters concerning personnel which might affect safety and efficiency in flying.

The Committee will be constituted as follows: Professor Sir Edward Mellanby, K.C.B., F.R.S., M.A., K.D., F.R.C.P., K.H.P. (chairman); Professor F. C. Bartlett, M.A., F.R.S.; E. A. Carmichael, F.R.C.P.; C. S. Hallpike, M.R.C.P., F.R.C.S.; B. H. C. Matthews, Sc.D.; Sir John Parsons, C.B.E., F.R.S., F.R.C.S.; Professor L. J. Witts, M.D., F.R.C.P.

The representatives of the Air Ministry on the Committee will be: A.V-M. A. V. J. Richardson, C.B., O.B.E., K.H.S., Director of Medical Services, and Air Comdre. H. E. Whittingham, C.B.E., F.R.C.P.(E.), K.H.P.

Professor Sir Edward Mellanby, who was born in 1884, is Secretary of the Medical Research Council and Nuffield Trustee for Medical Research. He has been Hon. Physician to H.M. the King since 1937 and was formerly Fullerian Professor of Physiology, Royal Institution, and Emeritus Professor of Pharmacology, University of Sheffield.

Professor Bartlett was born in 1886. In 1922 he was appointed Director of the Psychological Laboratory, University of Cambridge, and since 1931 he has been Professor of Experimental Psychology there. In 1924 he was appointed Editor of the British Journal of Psychology.

Mr. Carmichael is Director of the Neurological Research Unit of the National Hospital, London.

Mr. Hallpike is Foulerton Research Fellow of the Royal Society and is associated with the Ferens Institute of Otology, Middlesex Hospital.

Dr. Matthews was born in 1906. He has been Assistant Director of Physiological Research, Cambridge, since 1932, and was British Member of the 1935 International High-Altitude Expedition for Physiological Research.

Sir John Herbert Parsons was born in 1868. He is Consulting Surgeon, Royal London Ophthalmic Hospital, and Consulting Opthalmic Surgeon, University College Hospital. He was President of the Royal Society of Medicine, 1936.

Professor Witts, who was born in 1898, is Nuffield Professor of Clinical Medicine, University of Oxford. He is a member of the Medical Research Council and Hon. Secretary of the Association of Physicians of Great Britain and Eire.

A.V-M. Richardson, Director of Medical Services, Air Ministry, was born in 1884 and became a Surgeon in the Royal Navy in 1908. In 1918 he became a temporary major in the Medical Branch of the R.A.F., being granted a permanent commission with the rank of Wing Commander in 1919. He was promoted to Group Captain in 1927, Air Commodore 1934, and Air Vice-Marshal in March, 1938. In March, 1935, he was appointed Hon. Surgeon to H.M. the King.

Air Comdre. Whittingham, who was born in 1887, is Commanding Officer, Central Medical Establishment, Royal Air Force. He joined the R.A.M.C. in 1916 and was granted a permanent commission in the Medical Branch of the R.A.F. in 1919. He was promoted Wing Commander in 1923, Group Captain in 1932, and Air Commodore in 1936. In March, 1938, he was appointed Hon. Physician to H.M. the King.

PROBLEM PICTURE—actually, a Fairey Swordfish coming in to land on the flying deck of the carrier *Courageous*, as seen from the quarterdeck.

Volunteer Reserve Sporting and Social Activities

THE Volunteer Reserve aerodrome messes are now working up a healthy social side to their activities. Several very successful affairs have been held, and Hatfield, in particular, thanks to the co-operation of the De Havilland Company and the restaurant manager, have held regular dances at the aerodrome.

On February 26 a car rally and treasure hunt proved very popular with the competitors and is to become an annual or twice yearly event. The usual combustible and edible prizes for drivers and passengers were offered, with the alternative of half an hour in the air.

A Rugby match was staged at Hatfield on the following Sunday afternoon between the Hatfield and Luton messes. Bedford and East Midland players figured among the Luton fifteen, possibly to hold Prince Obolensky had he been playing. Hatfield led at half-time, but finished 17—9 down. An inter-mess squash match is soon to be organised

Royal Air Force Flying Club

THE annual dinner and dance of the Royal Air Force Flying Club was held at the Hyde Park Hotel, London, on Friday, March 3. Members from Hatfield, the "home" aerodrome, were particularly in evidence, and the evening was a thoroughly good affair. Coupled with this statement should be a mention of a good dinner and a good band.

It would have been pleasant to see a few more of the younger "regulars," but the evening will go down on the "must" list for future occasions

SERVICE AVIATION (CONTINUED)

The Air Force List

THE March issue of the *Air Force List* has now been published. It can be purchased (price 4s.) from H.M. Stationery Office at the following addresses: Adastral House, Kingsway, London, W.C.2; 120, George Street, Edinburgh; 2, York Street, Manchester, 1, St. Andrew's Crescent, Cardiff; 15, Donegall Square, Belfast; or through any bookseller.

Seversky Fighter at Martlesham

MAJOR ALEXANDER DE SEVERSKY has been demonstrating his two-seater "convoy" fighter at Martlesham. This machine is of typical Seversky design and, fitted with a Wright Cyclone engine, is claimed to have a top speed of 285 m.p.h. and a range of 3,000 miles, the interior of the wing being used as fuel space.

Royal Air Force Gazette

Royal Air Force

General Duties Branch

Honorary Colonel His Higness Raj Rajeshwar Maharajadhiraja Sir Umed Singh, Bahadur, G.C.S.I., G.C.I.E., K.C.V.O., A.D.C., Maharaja of Jodhpur, is appointed Honorary Air Commodore (Feb 27)

The following Flight Lieutenants are granted permanent commissions in that rank (March 3):—D. N. J. P. Leggett, P. A. McWhannell, F. Rump, J. B. P. Thomas.

E. K. Kitson (from Reserve) is granted a short service commission as Pilot Officer on probation (February 20); Acting Pilot Officer on probation J. E. Lydall is graded as Pilot Officer on probation (December 6, 1938).

The following Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated:—

November 8, 1938.—G. F. Chater (Acting Flight Lieutenant). January 22 (seniority October 22, 1938).—J. W. Dallamore (Acting Flight Lieutenant). January 27.—C. S. Cooper, A. W. D. Miller. February 24.—W. F. Barton (Acting Flight Lieutenant). March 2.—C. E. R. Tait (Acting Flight Lieutenant).

The following Pilot Officers are promoted to the rank of Flying Officer on the dates stated:—

June 25, 1938.—J. H. Grant. October 23, 1938.—F. R. Jamieson. December 9, 1938.—J. R. Pennington-Legh. December 13, 1938.—R. N. Wall. January 10.—G. P. Westropp-Bennett. January 13.—J. G. Swain. January 30.—S. N. L. Maude. January 31.—E. Tennant, P. W. Dawson. February 6.—T. V. Poltock. February 10.—T. F. T. Chambers; D. C. B. Riddick. February 13.—J. Dugdale. February 16.—D. B. Allison, E. J. Carter, G. B. B. Doudney. February 17.—A. J. Mould, H. E. Hopkins, T. W. Storey, J. T. L. Shore, C. A. Wallis. February 18.—G. E. Saddington, S. C. Pendred. February 28.—J. R. M. Boothby. March 4.—D. I. Fairbairn.

F/O. E. Banthorpe relinquishes the acting rank of Flight Lieutenant (January 30): P/O. P. D. MacL. Down takes rank and precedence as if his appointment as Pilot Officer bore date November 18, 1938; reduction to take effect from February 6. Flt. Lt. G. R. Canavan is placed on the half-pay list, scale B, from January 18 to February 13, inclusive. (Substituted for notification in *Gazette* of January 3). Wing Cdr. J. V. Steel, O.B.E., is placed on the retired list at his own request (March 3); Flt. Lt. H. M. T. Neugebauer is transferred to the Reserve, class A (March 3).

The following Flying Officers resign their short-service commissions (January 31):—J. W. H. Bray, I. G. Morrison.

P/O. T. H. Kilroy resigns his short-service commission (March 3).

The following relinquish their short-service commissions on appointment to the Air Branch of the Royal Navy on the dates stated:—FLIGHT LIEUTENANT.—S. Keane (February 20). FLYING OFFICERS.—A. S. Downes, L. J. Kiggell (January 30); G. I. L. Cordet, C. E. Ealand (February 20). PILOT OFFICERS.—G. A. W. Goodwin (January 30); A. F. Adie B. Paterson (February 10).

Flt. Lt. R. M. Hall relinquishes his short-service commission on appointment to a commission on the Unattached List for the Indian Army (February 22).

Equipment Branch

F/O. S. W. Needham (Acting Flight Lieutenant) is promoted to the rank of Flight Lieutenant (January 8).

Royal Air Force Reserve

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

The following are granted commissions in Class CC in the ranks on the dates stated:—

Flight Lieutenants.—Maj. W. V. Sherwell (October 10, 1938); H. G. Travers, D.S.C. (January 5); Maj. H. M. St. J. Carpendale, M.C. (R.A.R.O.) (January 7); Capt. D. R. Sharman, M.C. (January 10; seniority May 26, 1937); Capt. F. M. Rooth (Sp. U.L., I.A.) (January 13).

Lt. Col. F. J. Deighton (I.A., Ret.) (January 26); Capt. C. B. Seagrim (I.A., Ret.) (January 30).

Flying Officer.—Capt. J. A. Pring, M.B.E. (I.A., Ret.) (January 9).

F/O. H. A. Sawyer, M.C. (Maj., R.A.R.O.), is granted the rank of Flight Lieutenant (April 1, 1938); Flt Lt. H. S. Laws relinquishes his commission on appointment to a commission on the Unattached List for the Indian Army (February 10); F/O. G. H. Godwin relinquishes his commission on completion of service and is permitted to retain his rank (January 6); P/O. E. K. Kitson relinquishes his commission on appointment to a short-service commission in the Royal Air Force (February 20).

The notifications in the *Gazettes* of September 21, 1937, and November 15, 1938, concerning E. Gillespie, D.S.O., Lt. Col. (R.M., Ret.) and Flight Lieutenant, respectively, are cancelled.

Royal Air Force Volunteer Reserve

General Duties Branch

Rear-Admiral H. A. Forster, M.V.O., is appointed Honorary Flight Lieutenant with effect from December 13, 1938, and Honorary Wing Commander with effect from January 23, 1939.

The following are appointed Honorary Flight Lieutenants on the dates stated—Lt. Col. D. W. Reynolds, C.B.E., D.S.O. (R.A.R.O.); Rear-Admiral Sir Lionel Arthur Doveton Sturdee, Bart. (January 19); Brigadier B. C. S. Clarke, D.S.O. (R.A.R.O.) (January 23).

W. G. M. B. Broomhall is granted a commission as Flying Officer (February 21).

Administrative and Special Duties Branch

The following are granted commissions as Pilot Officers on probation (February 28):—E. M. Ackery, A.F.C.; G. D. Ashby; F. J. H. Bacon; F. A. Boyce; J. Carroll, M.C.; J. G. Collins; E. R. Coulson; H. B. Dakin, M.B.E.; W. C. P. Dale; J. T. Duckworth; H. W. Eaton; M. C. Ellison; T. A. Francis; P. H. Guimaraens; G. D. Hamilton; K. K. Horn, M.C.; J. H. C. Hunter; S. H. Joelson, M.C.; K. Jowers; D. F. Lapraik, D.F.C.; W. Ledlie; J. W. A. Legge-Willis; W. W. Lendon; J. H. Maguire; W. G. M. Money; S. G. Morgan; H. C. Page; D. J. W. Page; H. Parsons; A. J. Spiers, T. J. Stannage; G. Stephenson; A. F. Trinder; H. A. M. Whyte; C. A. Wilkin; A. M. Wilkinson, D.S.O.; G. H. Williams.

P. T. Carden, M.C., is granted a commission as Pilot Officer on probation (February 14). (Substituted for notification in the *Gazette* of February 21.)

Equipment Branch

F. J. Sharp is granted a commission as Acting Pilot Officer on probation (March 7).

Medical Branch

The following are granted commissions in the ranks stated (March 7):—

Squadron Leader.—D. H. Brinton, M.D., B.Ch., F.R.C.P.

Flight Lieutenants.—G. H. Bateman, F.R.C.S.; J. G. L. Brown, M.B., Ch.B.; H. A. Graham, M.D., Ch.B.; W. H Peirce, L.R.C.P., L.R.C.S.

Flying Officers.—J. C. Adams, M.B., B.S.; J. E. M. Barnes, M.R.C.S., L.R.C.P.; B. B. Bridges, M.R.C.S., L.R.C.P.; G. D. Dawson, M.B., M.S., Ch.B.; W. J. Lloyd, M.B., Ch.B., M.R.C.S., L.R.C.P.; O. Scarborough, M.B., Ch.B.; W. J. Scott, M.B., Ch.B.; A. B. Sproule, M.B., Ch.B.

Auxiliary Air Force

General Duties Branch

No. 500 (COUNTY OF KENT) (GENERAL RECONNAISSANCE) SQUADRON.—P/O. D. G. Mabey is promoted to the rank of Flying Officer (January 29).

No. 502 (ULSTER) (GENERAL RECONNAISSANCE) SQUADRON.—P/O. A. P. B. Holmes is transferred to the Reserve, Class C (January 17).

No. 600 (CITY OF LONDON) (FIGHTER) SQUADRON.—Flt. Lt. (A/Sqn. Ldr.) G. L. S. Dawson-Damer, Viscount Carlow is promoted to the rank of Squadron Leader (February 21).

No. 604 (COUNTY OF MIDDLESEX) (FIGHTER) SQUADRON.—Flt. Lt. (A/Sqn. Ldr.) R. A. Budd is promoted to the rank of Squadron Leader (February 21).

No. 607 (COUNTY OF DURHAM) (FIGHTER) SQUADRON.—Flt. Lt. (A/Sqn. Ldr.) L. E. Smith is promoted to the rank of Squadron Leader (February 21).

No. 608 (NORTH RIDING) (FIGHTER) SQUADRON.—Flt. Lt. (A./Sqn. Ldr.) G. Shaw is promoted to the rank of Squadron Leader (February 21).

No. 904 (COUNTY OF SURREY) (BALLOON) SQUADRON.—Capt. Sir William Brass, M.P., is appointed Honorary Air Commodore (March 7).

No. 905 (COUNTY OF SURREY) (BALLOON) SQUADRON.—Capt. Sir Connop Guthrie, Bart., K.B.E., is appointed Honorary Air Commodore (March 7).

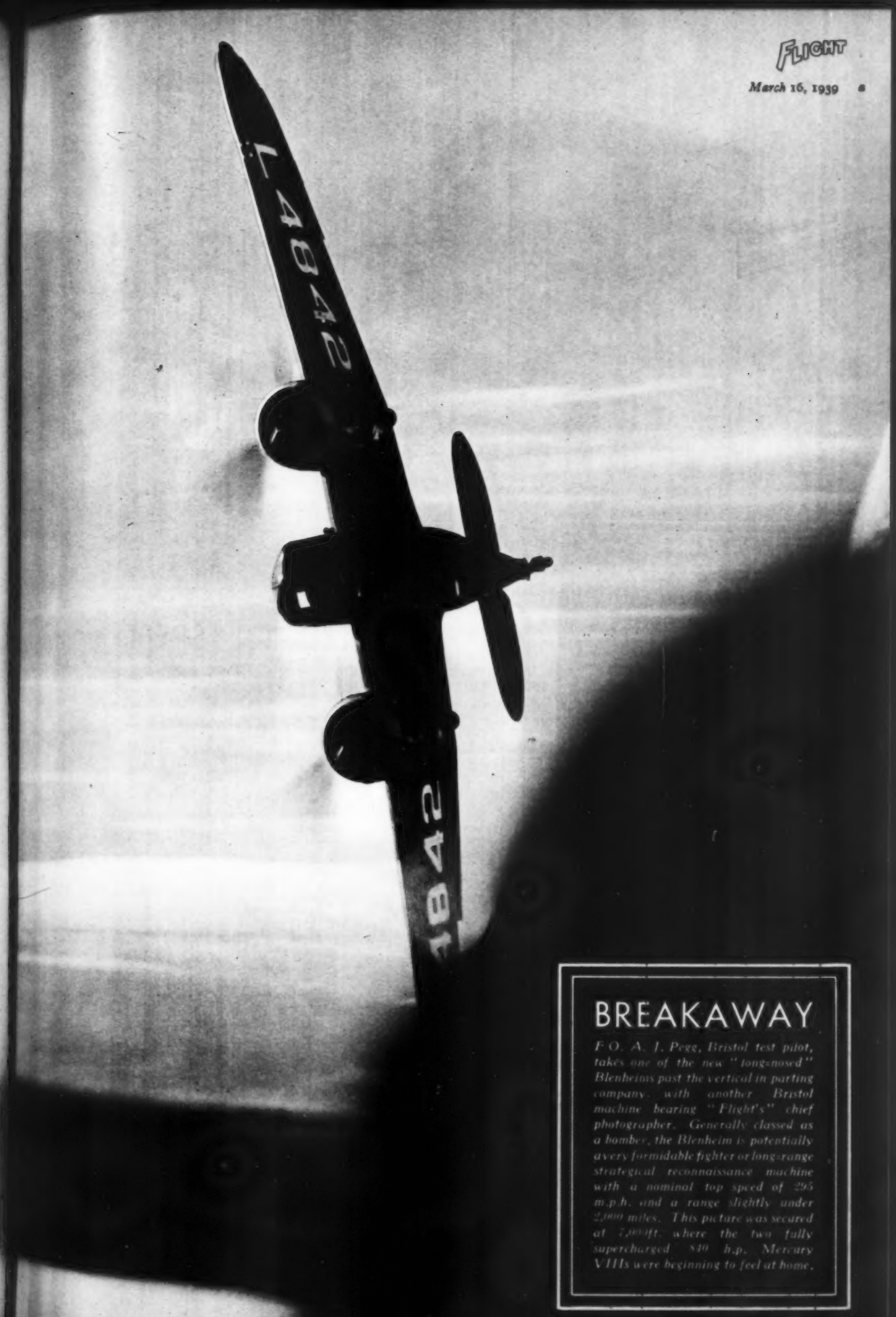
No. 909 (COUNTY OF ESSEX) (BALLOON) SQUADRON.—H. W. Kerr, M.P., is granted a commission as Pilot Officer (February 15).

No. 910 (COUNTY OF ESSEX) (BALLOON) SQUADRON.—Maj. F. V. Drake, M.C., is granted a commission as Squadron Leader and appointed to the command of the Squadron (February 1); A. M. Lyons, K.C., M.P., relinquishes command of the squadron on being appointed to the General List (February 1).

Auxiliary Air Force Reserve of Officers

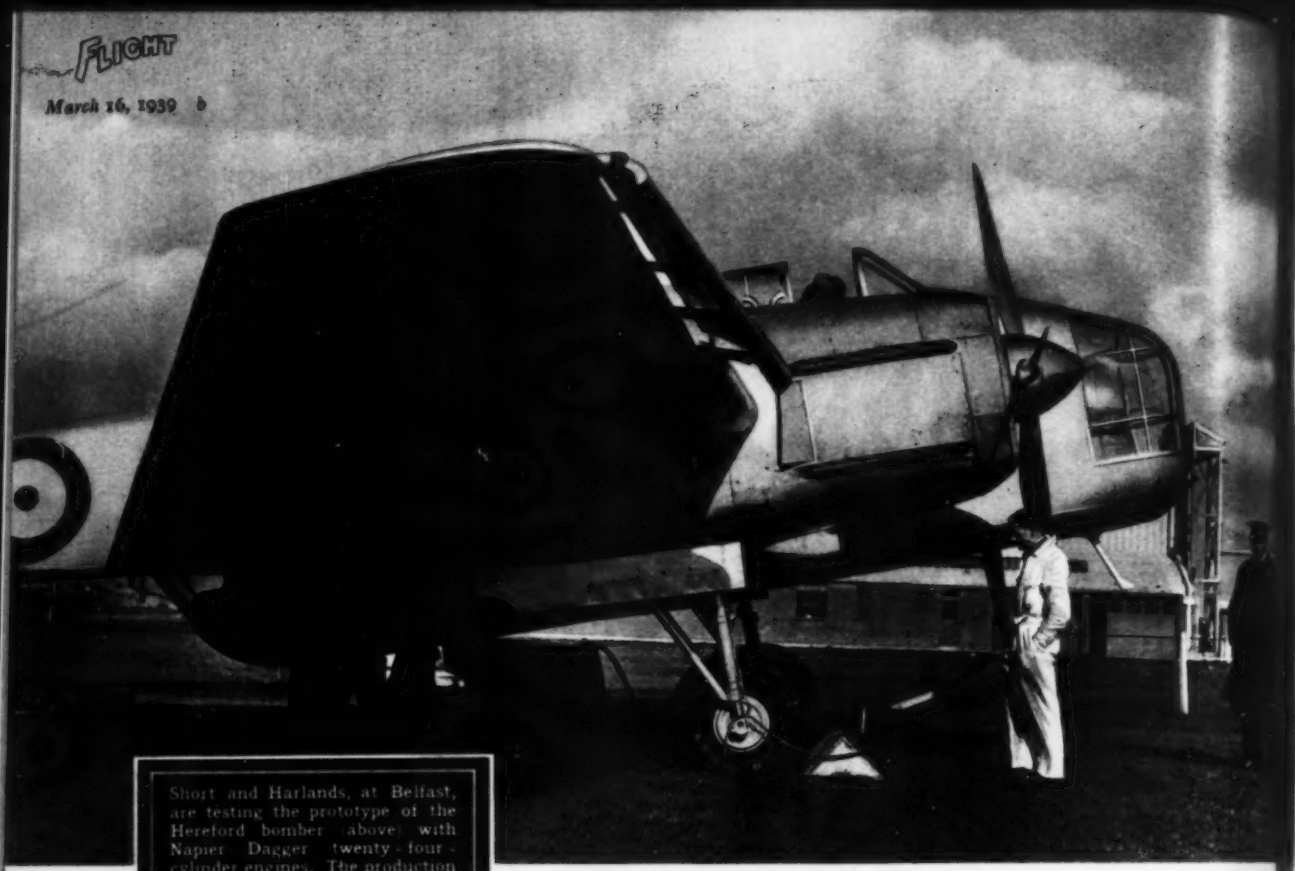
General Duties Branch

J. S. Schrieber is granted a commission as Flying Officer in Class C (January 26).



BREAKAWAY

F/O. A. J. Pegg, Bristol test pilot, takes one of the new "long-nosed" Blenheims past the vertical in parting company with another Bristol machine bearing "Flight's" chief photographer. Generally classed as a bomber, the Blenheim is potentially a very formidable fighter or long-range strategical reconnaissance machine with a nominal top speed of 295 m.p.h. and a range slightly under 2,000 miles. This picture was secured at 7,000ft. where the two fully supercharged 840 h.p. Mercury VIIIs were beginning to feel at home.



Short and Harlands, at Belfast, are testing the prototype of the Hereford bomber above with Napier Dagger twenty-four-cylinder engines. The production type, now nearly ready, is similar, but the fuselage is rounded off and generally smoothed down, making the Hereford similar (except for the engines) to the production type Handley Page Hampden seen below. Hampdens are being delivered in quantity with two-speed supercharged Bristol Pegasus radials. H.P. lift slots make for brilliant performance in the Hampden and Hereford.

SLOTTED for SPEED

"Flight" photographs.

The scene on the right, in the control tower at Croydon, is interesting because the photograph was taken during the night—at about the time when the K.L.M. D.C.2 freighter is due in from Amsterdam. Below is a typical layout at a smaller airport — actually Ringway, Manchester

Air Traffic Control Problems: The Control Officer's Responsibilities

By GEORGE F. YUILL

QBI—and WHY

THE Air Traffic Control Service is not a newcomer to civil aviation, as those who have used Croydon for many years well know; but, with the advent of many new airports, new regular services, new aircraft radio stations, increased R.A.F. and private flying, and the increasing volume of night flying (not to mention the well-known opaqueness of British weather) it has been found necessary greatly to increase it. Ultimately, it may extend to every important airport and civil radio station in this country.

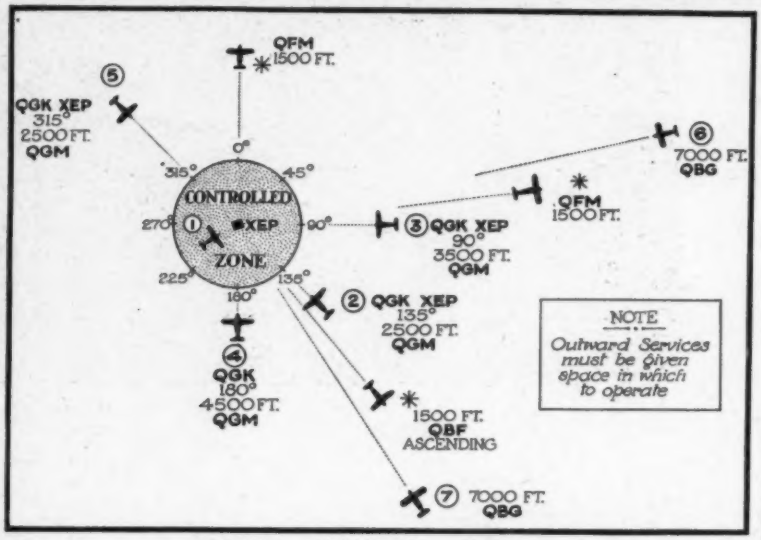
For the benefit of readers who, perhaps, are not quite familiar with recent developments, Air Traffic Control is a service provided by the Air Ministry, and it is concerned with giving advice to pilots to ensure safety in flight. The territories served by Control stations are, in general, the "radio communication areas" in which they are situated (these are detailed in *Notice to Airmen* No. 278 of 1938) and cover a wide district. For instance, the Manchester area extends from near the Irish coast out into the North Sea, and from the Midlands to the Scottish border. Although radio-equipped aircraft make greater use of the Control service than do others, all pilots may make use of the service when they wish, but when the weather is bad and QBI (Control-zone regulations for conditions of poor visibility) is in force no flights may take place at all within the published Control zones without the permission of the appropriate Control Officer. While safety of flight is the main preoccupation of the Control, there are various other duties to be carried out depending on the particular area or aerodrome concerned. For instance, where the communication area includes a considerable sea crossing the duty of being "life-saving Control Officer" if an aeroplane descends unintentionally in the sea devolves upon the Control staff; and where night flying is done the operation of all the aerodrome lighting and signalling is, in many cases, their responsibility.

Pilots of aeroplanes without radio have the minimum contact with Control, for the obvious reason that they can only make contact before and after a flight, but the commanders of airliners are in constant touch and make great use of the service. Of course, the amount of use made varies greatly with the individual and the kind of weather. In clear weather services pass from airport to airport with only the minimum of routine messages between commander and Control, e.g., (1) departure; (2) height of flight; (3) passing of recognised reporting point, and finally (4) leaving the communication area.

In conditions of poor visibility, such as days of great masses of cloud, the volume of communication between ground and air increases enormously—in fact, up to the point where the allocated wave-length is fully utilised and any unnecessary message sent by radio is an inconvenience to other aircraft wanting some important advice quickly. The present-day airline commander, only too aware of the importance of not sending unnecessary communications, restrains any tendency to "jam the air" with requests which might be a bother to his unseen colleagues flying blind in the same area. Incidentally, the banter he may suffer from them over a cup of tea in the buffet, if he is heard asking "QTR?" ("What is the correct time?") or some other needless question, tends to encourage him to keep radio messages at a minimum!

When many aircraft are flying blind at present-day speeds of three miles a minute and over the need for accurate flying and close liaison with Control is obvious, and it is not at all confined to QBI conditions. The following are some of the important communications which pass between ground and air to ensure the safety of services: "Are any aircraft flying in my vicinity?" "What height should I fly?" "May I descend (or ascend) through the clouds?" "What is the direction for landing?" "May I land?" "May I land, using the radio landing beacon?" "What is my bearing and distance?" "What is the weather at . . . ?"

It is the Control Officer's responsibility to answer these questions with the best advice, taking into account the many varying factors which may affect each case. When a "controlled zone" is in force (QBI) there are many further messages which must pass, including: "What is my turn for landing?" "May I enter the controlled zone?" "Can you direct my landing?" And, from the



TYPICAL SITUATION DURING QB1 NEAR XEP AIRPORT

2	*Number in circle is turn for landing allocated by control.*
✳	*Departing aircraft at advised heights.*
QGK	*Code message from control, meaning:- "Fly so that your bearing in relation to ..... is maintained at ..... degrees at a height of ..... feet."*
QGM	*From control, meaning:- "You must not enter the controlled zone."*
QFM	*From control, meaning:- "Fly at ..... feet."*
QBF	*To control from commander:- "I am flying in cloud at ..... feet."*
QBG	*To control from commander:- "I am flying above cloud at ..... feet."*

	TURNS FOR LANDING							AIRCRAFT	ESTIMATED TIMES OF ARRIVAL	ADVICE TO PILOTS
										QGP 1 (YOUR TURN FOR LANDING IS NO 1) QGL (YOU MAY ENTER CONTROLLED ZONE)
WAITING THEIR TURNS TO LAND						2		XAC	1205	QGK XEP 135° 2500 FEET QGM
					3			XAD	1208	QGK XEP 90° 3500 " "
				4				XAE	1215	QGK XEP 180° 4500 " "
			5					XAF	1220	QGK XEP 315° 2500 " "
OVER 120 MLS AWAY BUT MAKING FOR XEP AIRPORT		6						XAG	1250	NO INSTRUCTIONS YET.
	7							XAH	1305	

A more or less self-explanatory diagram showing a typical situation in the region of any big airport, the code sign for which is XEP. It is imagined that QBI is in force at the airport and that the time is 12.00 G.M.T.; the cloud base is at 300ft. and the cloud top at about 6,500ft. The diagrammatic representations of aeroplanes show the different arriving and departing services, with one machine actually making its bad-weather approach inside the controlled zone.

ground: "Your turn for landing is number . . . "; "You may not enter the controlled zone; fly so that your bearing from . . . is . . . degrees and fly at a height of . . . "

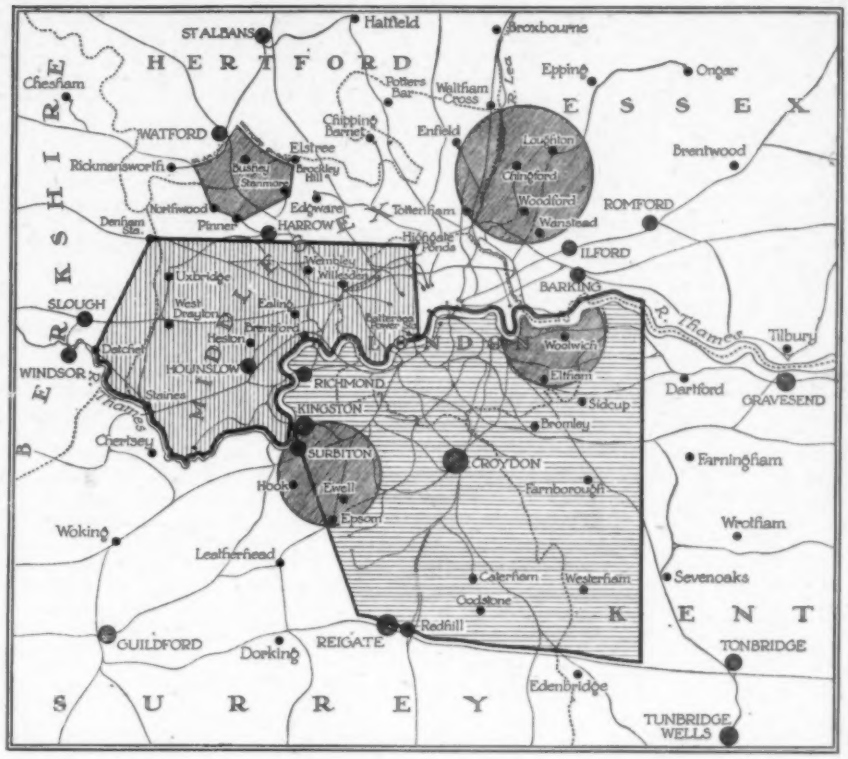
These messages have a sense of unreality to the unimaginative onlooker. First, in the cockpit of the aeroplane the obvious and material things are the crew, the glowing instrument board and the blank wall of mist or cloud outside the windows. Little visible change occurs, and the mind has to be jockeyed into action to realise that the outside vapours are being pierced at nearly 100 yards a second; that in them other equally blind and equally fast machines are converging on the same unseen airport, and that only strict adherence to an orderly flight plan maintains the safety of all. Secondly, in the control tower, there are message dockets, flags on a map and telephones ringing; but the important fact is the unseen and unheard fleet of aeroplanes speeding blind across the communication area, for the safety of which the Control Officer is concentrating on every message received and radio bearing obtained.

Airliner commanders are able to help themselves, to a very great extent, by making use of aids to navigation other than those provided at a radio and control station. For example, many airports now have a "navigational radio beacon" which transmits its call sign followed by a long dash, on which, by the use of the loop aerial on board, an accurate bearing may be taken. Also, there are ship coastal radio beacons and the powerful radiations of broadcasting stations; on both these, bearings may be taken from the air.

From such different sources position may be determined by the navigator without the aeroplane making any transmission at all, thereby leaving the ether free for essential control and other messages. It is, however, desirable that the pilot using such facilities should still report his progress and height to the Control station, otherwise the officer there may not have sufficient data upon which to give proper advice to the machine concerned and others flying near it. In the same way, the pilot of an aircraft making use of a radio landing beacon apprises Control of his intention so that his line of flight may be noted and any necessary warning issued to him or others.

In view of the importance of the messages passed between captain and Control it is, of course, of the utmost importance that no mistake should occur between pilot and operator working in the noise of the cockpit, otherwise a series of misunderstandings are liable to occur and may ultimately involve others besides those originally concerned. Many careful pilots insist on all communications between themselves and their radio officers being written; others do not. Conversations between members of crews frequently reveal the fact that the captains are deputing much of their responsibility to their W/T operators regarding reporting of height, track, position, etc., irrespective of whether they are in the best position to shoulder it. Many queer misunderstandings between ground and air are found to be caused by bad liaison between pilot and radio operator, and many of them appear to be due to the practice of passing messages verbally in noisy cockpits. For instance, in rain, low cloud and generally dirty weather, a pilot may shout to his operator, "Ask if I can descend now," and the reply obtained from the Control is shouted back by the operator, "You mustn't decend through the clouds." This is heard incorrectly by the pilot, who is preoccupied with bumps and rain, as "Descend through the clouds," and down he goes to find himself tree-tipping, as he breaks through, instead of flying in the clear vicinity of the airport.

All radio telegraphic messages are sent, so far as possible, in the "International Q Code," which reduces the time taken to transmit signals tremendously and eliminates language difficulty. A good example is the familiar (to those in airline work) "QDM?" which means: "The



London's two bad-weather controlled zones—for Croydon and Heston—with, as a matter of present-day interest, the balloon-flying danger areas. The latter, of course, are approximate only.

magnetic course to steer to reach this station in zero wind is . . ." There is a handy Stationery Office publication giving all the "Q" code groups under two headings, alphabetical and by subject, which should make the use of the correct ones a simple matter. Unfortunately, while most of the more recently qualified pilots have a rough knowledge of its contents, apparently nobody has given it in a birthday present to the more senior airline captains. Some of the latter have been heard to express the opinion that it is not their job to put messages into code, but that of their W/T officers. I cannot recollect having seen it stated anywhere whose duty it really is, but it is obviously desirable for people originating messages to know exactly those common phrases, which can be used in code form, otherwise they are liable to force upon their operators the thankless task of deciding which of a number of approximating phrases should be used. For instance, "Ask them to put the Lorenz on," said by pilot to operator, probably is intended also as a request for permission to land by the use of it, but if the operator takes his commander literally, as he should, he will only make the request "QFS ATT" ("Please place the landing radio-beacon in operation") instead of adding the group "QGA?" ("May I land immediately, using the radio-beacon signals?"). When he meets another machine taking off along the Lorenz path he is probably angry that this should be so, and subsequent analysis, showing the signals received, may make him blame his radio operator—not too fairly! However, there is a "Big-hearted Arthur" quality in these old salts of the air, and they are quick to grant a hearty exoneration to all concerned for their own errors of omission and commission.

The Collision Danger

Handy though the "Q" Code book undoubtedly is, its various messages suffer from lack of full marginal explanation, and great care must be exercised to ensure that neither Control nor aircraft reads a wrong interpretation into their remarks. One of the very common requests to Control from air is "QAI?" ("Has any aircraft been signalled in my neighbourhood?"), but, unfortunately, a "neighbourhood" is not defined. Almost certainly it is not a fixed quantity like a municipal locality; it varies in size, depending upon the speed of aircraft. Two aircraft approaching each other at an air speed of 90 m.p.h. each are half an hour apart at 90 miles distance; but an Albatross, approaching another liner the same type, is less than fifteen minutes away at the same distance. Also, how high above does the "neighbourhood" extend? Again, the answer (not given) is obviously variable. It might seem that the safe course would be to give a list of all the possible aircraft but, at busy periods, this would involve the radio staff in a task which would take up all their time to the exclusion of other messages.

The Control Officer asked by a pilot in the air "QAI?" may reply, if he is hard-pressed for time, by the signal "QFM 1,000 m." ("Fly at 1,000 metres"), provided he is sure that this height is a safe one at which the machine may fly. Having done this to save congestion on the ether, and having quickly turned to the next request from another aircraft, he may be excused a sense of exasperation if the reply from the machine comes back "Why? QAI?" (meaning, "Why should I fly, as you suggest, at 1,000 metres? Are there aircraft flying in my neighbourhood?") Unfortunately, there is no code group meaning "No, I am just doing this for fun, old man."

Layer Difficulties

Probably the most difficult job in the Control Officer's day is concerned with this signal "QFM" ("Fly at . . . height") when there is a solid mass of cloud from less than 1,000 feet above the ground right up to 8,000 feet or more. Under these conditions practically all aircraft will require direction or advice from the Control of the area through which they are flying. While things are quiet it may be easy and satisfactory to inform each of the few machines concerned of the others' height, tracks, E.T.A. (estimated times of arrival), position reports, etc., and thereafter to allow the captains to navigate their craft so as to avoid any risk of collision. Even this apparently easy procedure has its drawbacks, however. For instance, having issued such information, the pilot of a foreign aeroplane from a country where Control is rigidly positive may then ask, "Tks., but QFM?" (meaning, "Thanks, but at what height must I fly for safety?"). The snag about this now is that if he is told to fly at some definite height, he will immediately presume that to be a safe height, whereas the other aircraft making their own arrangements may be either at that height or passing it while altering altitude. On the other hand, it would certainly not be right to send a signal meaning "Go where you like."

Another drawback to the procedure of simply giving commanders particulars of other aircraft is that it is quite possible that, if they are kept waiting a turn to land in QBI, it will transpire that the one to land next is jockeyed, by the presence of other machines, to the highest position; and on being given "QGP 1" ("Your turn for landing is No. 1") will have to descend through the layers occupied

by other machines of whose position he is not at all certain. Purists will at once point out that in QBI only a single aircraft is in the Zone at a time—the one whose turn it is to land—and so there is no danger; but the less pure know that, while this ideal is the aim of all, it would be an unsafe assumption on many occasions. After flights of over two hundred miles without any view of the ground, a wait of possibly 45 minutes, still flying blind, changes of altitude as advised by the Control into strata where the wind is very likely considerably different from the one accounted for during the route flight, and remembering the speed of modern aircraft, it is only natural that the machines which are numbers 2, 3, 4, 5, etc., for landing may be trespassing occasionally in the sacred territory of the controlled Zone. Apart from the chance of colliding with No. 1, who is the legitimate occupier, trespassers may cause a mistake to be made regarding "motor noises signals," especially if they are flying similar types.

With the above risks in mind, and having before him the flight plan of departing aircraft commanders, the careful Control Officer is more likely to adopt the much more positive method of advising each aircraft, as it enters his area, to fly at a stated height determined, so far as possible, by the expected order of landing. This work is made much easier for him when each commander radios his E.T.A. (estimated time of arrival) as soon as he enters the station communication area (some forty-five minutes away, on a rough average), and it also prevents his slide rule overheating. By this means No. 1 would be lowest, No. 2 next lowest and so on, and descent by QGP 1 (to use the Q-code designation of the first in landing order) is safe irrespective of the wanderings of the others (see diagram).

The Moving Staircase

It is a matter requiring a good deal of concentration to devise this stratified structure of swiftly moving aeroplanes, some coming, some going, and others passing; some entering the area high who would be better low, some off course to starboard who would be very much better off course to port, some silent who should be communicative, others chatty who should be quiet. The Control Officer would be very puzzled indeed to know what advice to give to any machine which did not adhere to the advised height, because, with all adjacent strata allocated to aircraft also flying blind and their positions only approximately known, any move made by the errant one might well prove dangerous. Fortunately, airline commanders are clearly aware of this possibility and mostly adhere very closely to the advice given, even when tempted to change height by the sight of an unexpected break in the clouds. The snag about descent through such a "hole" is, of course, either that it may close up or that the pilot will find himself unable to continue flying below or between cloud and be suddenly compelled to fly blind at a height other than the safe one advised. This would be a most unpleasant contingency and it would obviously be redundant to ask, "Are there any aircraft flying in my vicinity?" So the wise commanders stick to their original heights and scrupulously avoid any unadvised variations.

Compared with the channels used by shipping traffic the "illimitable" quality of the airliners' ocean seems to reduce to infinitesimal insignificance the risk of collision. A few dots smaller than pin points moving over a four-mile-to-the-inch map do more than represent an aeroplane to scale, and the number of strata over a given area are almost beyond measure. At first glance it would seem that aircraft are as remote from each other as the molecules in gas, but, unfortunately, a number of circumstances exist which make this assumption quite wrong. While the molecules are free to wander anywhere, aircraft are concentrating on the same objective and emanating from the same source. They tend to seek approximately the same altitudes because of engine requirements, weather conditions, and habit, and they tend to fly on the same tracks between their terminal points. There is a similarity between their angles of climb and their angles of descent. In fact, there are too many influences at work tending to crowd aircraft into quite close proximity. Any senior airline commander can recount at least one instance when he saw a shadowy form pass in thin cloud, in spite of the vastness of the sky. This crowding tendency has been acknowledged in the United States, where for some years "flight planning" has been the order of the day in airline work. Conditions are becoming similar in Europe and *Notice to Airmen* No. 279 of 1938 applies a similar procedure to flights in the United Kingdom and Northern Ireland. The routine is simple: Prior to departure the pilots of aircraft with radio advise Control of their times of departure, routes to be followed, heights to be flown, destinations, next stopping places, and estimated times of arrival at the next stopping places. With this information before him the Control Officer can more quickly and with confidence advise other aircraft heights to fly and route to follow. The successful working of Control is dependent upon pilots adhering strictly to the flight plans submitted, and reducing to a minimum the number of times they change height. The altitude graphs of some flights look more like a preliminary sketch for a proposed switchback railway than a record of orderly civil air transportation.

Pilots are often criticised, sometimes by other pilots, sometimes by knowing onlookers, for some irregularity in their use of the air; but it should be kept in mind that their skill in flying is almost certainly exceeded by the mass of assorted information, legal and otherwise, which they are expected to know. For instance, all pilots must be familiar with current *Notices to Airmen*, which flutter from the Air Ministry like autumn leaves (over 300 were issued last year). They should have digested the important items from "Temporary Conditions Affecting Flying" (out of the front of *The Air Pilot*), because a number of these are bound to affect them. At the time of writing there are 20 miscellaneous warnings and a similar number of "Conditions at Civil Air Stations" current. Then there are air navigation regulations with which persons engaged in aviation "should acquaint themselves." According to *The Air Pilot* there are over two score of these. They include "The Air Navigation Act, 1920," and ditto 1936, just to mention two of the *smaller* items!

To fly without transgressing any regulation or involving himself in any possible danger, each pilot must, further, be familiar with much of the contents of the remainder of this excellent volume, including a big list of danger areas whence there is popping-off of various cannon, mortars, and diverse ordnance, not to mention bombing and towing of aerial targets, cloud-flying areas, places with lofty obstructions to safe aerial navigation, and so on.

These are but a few of the items, chosen at random, and merely indicate in outline the enormous mass of information which the perfect pilot may be expected to have at his finger-tips. In the case of pilots who fly abroad there is a corresponding list for each country which they traverse, so they may well be excused occasional variations from perfection of procedure here and there.

International Complications

The I.C.A.N. is an excellent effort to minimise the number of legal difficulties in international flying, but, unfortunately, signatory authorities take advantage of the permission to make such local regulations as they may think necessary, with the result that the average pilot flies on in what he considers a normal manner until he comes headlong against some unsuspected regulation. He notes it for future avoidance, tells his colleagues about it and proceeds as before to the next occasion. This method works out not too badly in practice, but it makes the authorities a bit irritable to find that their nice new regulation is regarded as a queer local practice by international airline commanders, whose daily flights take them to many capitals. Shipping companies minimise transgressions of local regulations, either by employing captains with local pilotage tickets or else by engaging pilots for the navigation of complicated waterways. It may be that a similar procedure will, in time, be forced upon airline companies, because it is difficult to see how any one pilot can really be thoroughly familiar with the necessary regulations at many busy airports in as many different countries, and, as traffic continues to increase, misunderstandings will involve something more serious than an interview with local commandants or air traffic control officials.

ENGLISH
on the THAMES

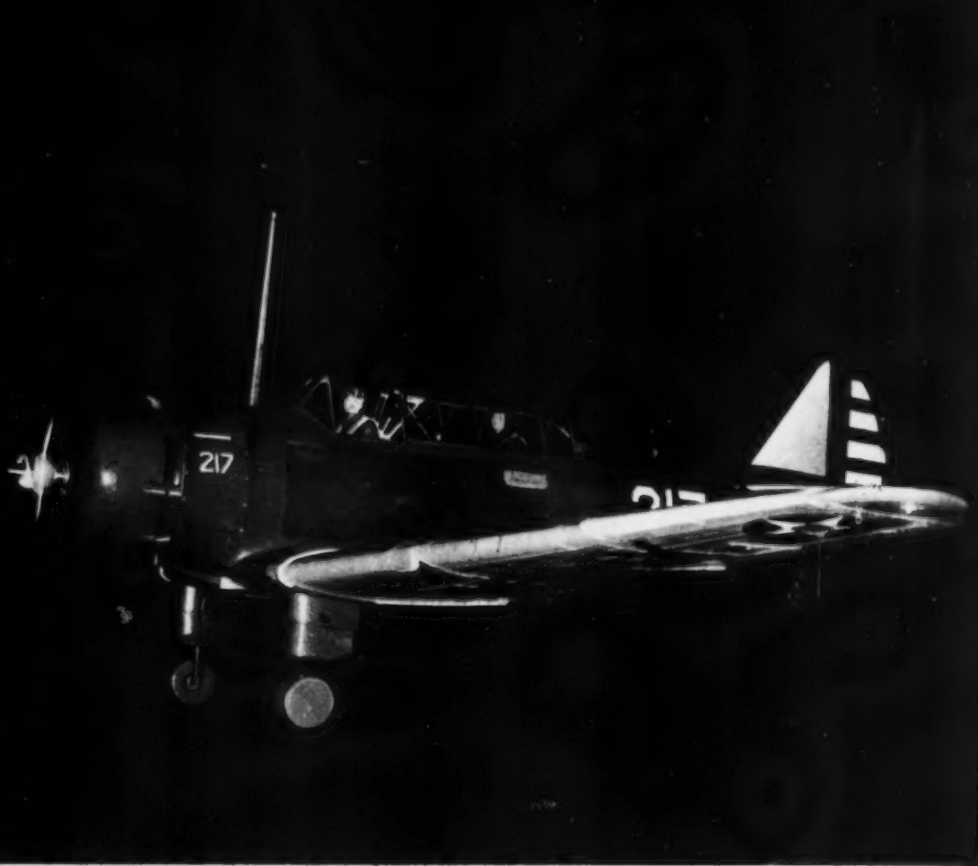
FLIGHT

March 16, 1939

h

NOCTURNE

The camera records, with the aid of flashlight, details of a North American "basic trainer" of the U.S. Army Air Corps. This photograph, taken at 10 o'clock at night near Randolph Field, Texas, is claimed to be almost unique. The machines were flying at 3,000ft.



BLUE HORIZON

The clarity of the picture below, in particular the sharpness of the horizon, gives a clue to the whereabouts of *H.M.S. Ark Royal*. Actually, she is seen in the Mediterranean during recent exercises.

COMMERCIAL AVIATION

THE GOLDEN GATE : A distinctly striking picture of one of United Airways Douglas D.C.3s flying over San Francisco Bay and the Treasure Island Exposition ground, which will be seen behind the fuselage of the machine. The Exposition has actually been laid out on an artificial island and this will afterwards be a civil landplane and flying boat base. P.A.A. are already operating therefrom.

THE WEEK AT CROYDON

"A. Viator" Finds a High Wind Educative and Discusses a Mode of Transport, Antiques (Human and Otherwise) and the Ways of Works and Bricks

WEDNESDAY of last week was a day of strong wind, which, in some respects, may be quite instructive at a big international airport.

There are the "giant air liners" which cease to function because they are too slow to face a strong headwind, and there is a sharp contrast between the manœuvrability of various types on the ground. Some machines have storm troops standing by to pounce on them and lead them ingloriously to the tarmac, whilst others, huge, dignified fellows, dance giddy waltzes on the apron. Some of the best known types, notably the D.H. Frobisher class and the Douglas D.C.3, appear to be quite unaffected.

One-way "record" flights were made on Wednesday, of course, the best, all things considered, being Irish Sea Airways, from Dublin to Croydon with six passengers in 1 hr. 28 min. A. D.L.H. Focke-Wulf Condor did Croydon-Tempelhof in 2 hr. 44 min., but one must remember the normal cruising speed of that type.

A problem was set for one K.L.M. pilot—with 21 refugee children (fleeing at a reasonably early age, I assume, from a culture likely to impose sparkling carrot-juice instead of beer)—who had the choice of flying high in steadiness against the gale, and losing a great deal of time, or flying low and more quickly, but in terribly bumpy conditions. The answer is that the pilot flew high and let the schedule go hang.

It is also an eye-opener to watch the machines of different companies arrive in windy weather. You can tell from the complexions of the passengers which firms insist that comfort is more important than speed, and, incidentally, which firms have machines that, in all respects, are suited to economical high flying.

Amongst the passengers by a Sabena machine from Brussels were an elderly married couple. What they had heard about our record for road accidents in this country I do not know. Anyway, they refused to go to London on the normal passenger coach, denied with emphasis any suggestion that they desired a private car or a taxi, and insisted on a horse cab.

One of these arrived in due course, snorting and steaming, and the old-world spectacle was witnessed of a top-hatted cabby strapping trunks atop of the cab, after which the whole show went swaying away down the road to East Croydon Station.

As a matter of fact, I know a certain aviation man who, whenever possible and in whatever capital of Europe he may be at the time, prefers, after a party, to ride home in a horse cab and a state of monumental dignity.

One day, in the year 1700 in Cremona, Italy, a craftsman named Antonio Stradivari turned out a brand new violin, shiny and smelling of varnish. Last week, K.L.M. accepted for the night freighter a genuine Stradivarius marked with the original label, which was dated 1700.

Air France has received a letter, in this year of Grace 1939, asking if there was, by any remote chance, any air service from London to or near Paris. Now some 81,568 souls (including English tourists, who have no souls whilst in Paris) flew to Paris in 1938—Air France carrying 31,919, Imperials 29,469 and British Airways 19,381. So you would think that some rumour of the air services to Paris might have spread even to the remoter rural districts.

I trust that I shall not be regarded as ribald towards Works and Bricks if I comment on the astonishing tarmac-sweeping display given on Wednesday, when the gale was at its height. Of all the places around here the tarmac is perhaps the only area which does not need sweeping. Any dust accumulating there is promptly "slipstreamed."

Sweeping Assertion

Nevertheless, there was "Gawld Flyke," the pale yellow horse, attached to a sort of dog-cart with a rotary brush underneath and flying the read and white flag. ("Mind your backs, chaps," in the International Code.) The driver was purple, for there was an icy nip to the gale, and the whole outfit staggered up and down three times, drifting sideways when the wind hit it.

After sweeping an exceedingly narrow area and accumulating three small piles of dust, "Gawld Flyke" and partner struck the flag and work simultaneously and went home to their teas. A solitary figure with a broom then advanced and attacked the piles of dust, which were borne by the gale straight into Rollasons' hangar, where those engaged on work of national importance wept like anything to see such quantities of sand.

W. and B. have just been given the job of spending forty-eight and a quarter million pounds in the coming financial year, so the vague and useless wanderings of "Gawld Flyke" don't really matter, and he is indenting for a set of solid gold shoes anyway.

Only after writing the above did I find out that the spring cleaning of the tarmac was due to a definite demand from one of the companies that certain loose pebbles on the tarmac should be swept away on account of possible tyre trouble.

I always try to be fair to Works and Bricks, and that's

(Concluded at foot of page 272)

Commercial Aviation

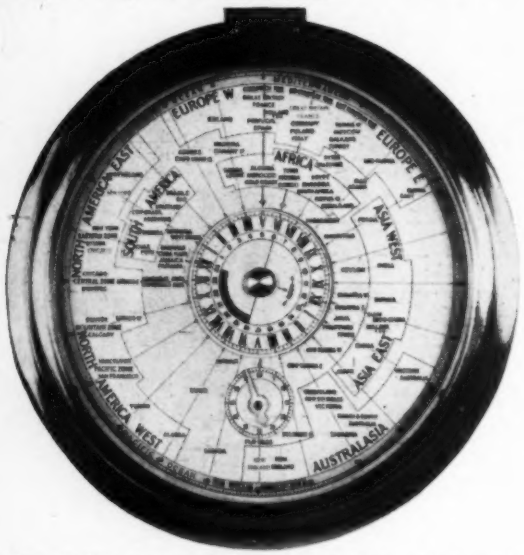
More Charter

A NEW company, Aviation Charter, is to start operations shortly. The directors are Lord Douglas-Hamilton (managing), Flt. Lt. Preston (chairman), Miss Ivy B. M. Forsyth and Mr. Edward Forsyth. Mr. N. Samuels, the pilot, well known to all and sundry at Croydon, is to be manager in charge of the company's Croydon office.

Everybody concerned is a pilot, and charter and army co-op. will be the main objects of the company. To start with a Miles Falcon Six, with blind flying and two-way radio equipment, will be employed. Other and larger machines will be purchased later.

World Time

THE Willis world clock, which indicates not only Greenwich time but, as the dial revolves past each meridian, the exact local time everywhere in the world, has now been produced on a smaller and lighter scale for use in aircraft. In its new form the clock has been designed to fit more or less flush with the instrument panel, and should be a useful item of equipment now that transport machines are being flown through to long-distance destinations.



How the face is arranged on the world clock. The twenty-four-hour dial rotates and the time is read off against the appropriate arrows.

The operation of this clock is extremely simple, with a twenty-four-hour moving disc in the centre and a separate minute hand below. The main face of the clock is laid out in sectors, with the names of all the more important countries and cities in the world indicated by arrows, and the time for each particular place is merely read off against the appropriate arrow. The timing disc itself is clearly marked in a.m. and p.m. sections, so that, even when the twenty-four method of reading is not being used, there is no possibility of error. Those countries and cities where "summer time" arrangements are in force are printed separately in red type. For example, Great Britain and France have two positions, one at Greenwich time and one, for the summer season, on the mid-European time arrow.

Needless to say, such a clock will be useful in working out E.T.A.s which are likely to be at or near nightfall, and also for timing the reception of both weather broadcasts and others required for D/F bearings. The world clock is obtainable from J. H. Willis and Company, Ipswich Road, Norwich, and the aircraft or small marine type, for instrument-board mounting, is priced at 137s. 6d.

Adcock at Heston

TO-MORROW a new Adcock D/F station, which has been erected on Hounslow Heath, will take over the general D/F service of the Heston area on a frequency of 348 Kc/s. In the ordinary way all bearings will be given from this new station, but if it is found necessary to give a bearing from the Heston D/F station on the same frequency, each will be prefixed by the letter "A." Normal local bearings for approach assistance will continue to be given on the QBI channel of 327-328 Kc/s.

By Night from Montreal

ACCORDING to plan, the first flight of trans-Canadian night mail was sent off on March 1 from St. Hubert airport, Montreal. The Trans-Canada Airways Lockheed Electra took off shortly after 9 p.m. carrying about 500 lb. of mail, and the usual scheduled stops were made on the way to Vancouver. At Regina, Prairie Airways connected with the service to take over the mail for Saskatoon and Prince Albert.

The next important step in the development of the trans-Canadian service will be the start of a passenger service between Montreal and Vancouver, which should be made early next month.

Trans-Tasman

THE first of the modified "C" class boats for Trans-Tasman service should by now have been launched at Rochester. This boat will be named *Aotearoa* and will, in due course, be commanded by Capt. J. W. Burgess, who was in charge of *Centaurus* when that machine left England at the end of 1937 for the first through survey flight to Australia and New Zealand.

The second of the Tasman boats will be called *Australia* and will be looked after by Capt. G. C. Butler, while the third of the boats will be known as *Awarua*. It is not expected that the Tasman service will be in operation much before September this year, since the bases, radio facilities, and meteorological services have not yet been put in order. Another point is that the Australian and New Zealand authorities prefer that the services shall be started at the beginning of the antipodean summer.

It is expected in Australia that this month will see the official formation of Tasman Empire Airways, the company which will, of course, operate the Sydney-Auckland service. The shareholders will be Union Airways of New Zealand, Imperial Airways, and Qantas Empire Airways.

Southern Airways

EARLY in October last year a new company, Southern Airways, which is a subsidiary of the Straight Corporation, applied for A.T.L.A. licences to operate services between Ipswich and Clacton and between Ilford and Ramsgate. At a private enquiry held by the Authority in January it was found that the company was considering the combination of the two services, and the consequent operation of one between Ipswich and Ilford, with intermediate landings at Clacton and Ramsgate. Another application was received last month for a licence covering this service with, additionally, an optional landing at Southend.

Though the company is a comparatively new one and the routes untried, the experience of the parent and other subsidiary companies was taken into account, and the Authority granted a licence for a year with an on-demand schedule until June 17 and a compulsory daily schedule (with a thrice-daily schedule between Ilford and Ramsgate) between June 17 and September 18.

Southern Airways actually operated a service once daily in each direction between Ipswich and Clacton, as an experiment, between June 1 and September 18 last year. In this period they carried 626 passengers. Later, the company started a service between Fairlop Aerodrome, Ilford, and Ramsgate, and during a period of a little less than two months 108 passengers were carried.

THE WEEK AT CROYDON

(*Concluded from p. 271.*)

why I have worked indefatigably to deny the latest rumour. It is to the effect that work on the new hangar is held up because the secret plans were stolen from the shopping basket on the handlebars of the W. and B. tandem, when that full-feathering controllable pitch machine was recently left outside the Co-op. Scotland Yard was of the opinion that it was not a Co-op. at all, but the H.Q. of International Documents Transfer, Ltd. (telegrams: Espion, Albion) with a false façade.

Colour is lent to this theory by the fact that the bacon bought there by W. and B. would not fry and turned out to be red flannel cunningly striped with white paint.

An I.N.A. Accident

ON February 23 two machines belonging to India National Airways collided when flying on the Karachi-Lahore route. The bulk of the air mail carried was saved. This accident is the second this year on Indian internal routes; a few weeks ago one of the Tata Wacos crashed in bad weather.

Channel Island Licences

AS might be expected, Jersey Airways, whose services now virtually form a part of the Railway Air Service network, had no difficulty in obtaining their provisional Air Transport Licensing Authority licences. The two old-established runs—Jersey to Southampton and Jersey to Heston—have been licensed for seven years, while the newer Jersey to Exeter and Jersey to Shoreham services have been licensed for two years. In the last cases the routes will be flown in each direction on Fridays and Mondays.

Additionally, Guernsey Airways, a subsidiary company, has been granted two-year licences for Guernsey-Exeter, Guernsey-Heston, Guernsey-Southampton and Guernsey-Brighton services, which will be operated experimentally during week-ends in the summer. At the enquiry various traffic figures were given. In 1935, for instance, Jersey Airways carried 24,624 passengers, and this figure increased steadily to 33,875 for last year.

Air France's 1939 Plans

DURING this season Air France will operate six cross-Channel services to Paris daily throughout the season, using sixteen-seater Marcel Bloch machines, leaving Croydon and Le Bourget simultaneously at 9 a.m., 11 a.m., 1 p.m., 3 p.m., 5 p.m. and 7 p.m. every day of the week. The new schedule will start on April 16.

The timetables over the company's entire European network have been simplified and speeded up, and a number of new services will be put into operation. Le Touquet will be served by a daily service from Croydon, and there will be two services daily to Cannes. Dinard, on the Normandy coast, and La Baule, on the Atlantic seaboard, will have services from London at week-ends. Vichy, the inland resort, will also, for the first time, have an air service from London and Paris. Switzerland is also to be served with a new direct service from London, via Paris, to Geneva, in addition to the existing service via Lyons. There will be two services to Zurich, one of which stops at Basle. There will be a daily service to Bordeaux and, now that conditions on the Basque coast are once again more settled, an extension will run from Bordeaux to Biarritz during that resort's high season. There will also be a daily service from London, via Paris, to Prague, stopping at Strasbourg, and another from Paris, starting in the early morning.

The Riviera will be served by two daily services to Cannes. The Cannes airport has been enlarged so that, instead of the ten-seater Wibaults, twenty-five-seater Dewoitine 338s will be able to land there. For the first time a flying-boat service will be run from Cannes to Corsica, stopping at Ile Rousse as well as at Ajaccio. These boats will start out from Cannes.

This Atlantic

IF weather conditions are favourable, it is possible that the first of Pan-American Airways' Boeing 314s will by now have started an experimental flight to Europe. A little over a week ago P.A.A. officials in New York said that the *Yankee Clipper*, as it is named, was ready to make the crossing. It is not known for certain whether a load of journalists will actually be carried on this first flight, or whether they will go over on a second experimental crossing. At the moment P.A.A.'s idea is to obtain as much publicity as possible from their preliminary Atlantic flights.

Meanwhile *Cabot*, one of the modified "C" class Atlantic boats, has completed its airworthiness trials at normal loadings, and the refuelling arrangements are now being tested before it is certificated for still higher loadings. The machine has taken-off under its own power at an all-up weight of 48,000 lb.—2,000 lb. more than the prescribed figure. After refuelling the all-up weight will be 53,000 lb.

It will be remembered that Captain F. Entwistle, the chief of the overseas division of the Air Ministry Meteorological Office, is at present in South America in connection with the British South Atlantic service. In an interview which he gave recently in Buenos Aires he confirmed the already understood fact that modified "C"-class boats would be used by British Airways between Bathurst and Buenos Aires. It is possible that, when ice closes the harbours on the North Atlantic, the boats will be transferred to the South Atlantic mail route. Capt. Entwistle also said that the mail-carrying charges on this country's services would be likely to be a great deal less than those made by Air France and D.L.H.

West Indies Extensions

EARLY last month K.L.M. started their new service from the base at Curaçao, to Barbados, via Trinidad. It is being flown once a week over the first part of the route, and three times a week between Trinidad and Barbados.

During this year it is expected that the K.L.M. network in the West Indies will be extended to Surinam and Paramaribo, in Dutch Guiana. The latter extension, which will be a continuation of the Trinidad run, is likely to be of particular importance, since it will reduce a seven-day journey to one of seven hours.

A Civil Hercules

SPECIALLY developed for installation in civil aircraft, the new Bristol Hercules IV has an international power rating of 1,010-1,050 h.p. developed at 2,400 r.p.m. at 4,500ft. The maximum output for all-out level flight is 1,220 h.p. at 2,800 r.p.m. at 5,500ft., but for take-off at the same crankshaft speed, 1,380 h.p. is available. Thus the Hercules IV is the most powerful aero engine available for commercial use in this country.

Not only has a Hercules IV, it is reported, passed its type test with complete satisfaction, but it recently completed an equally successful 250-hours' endurance test, representing 40,000 miles or more of flying under conditions of maximum fuel economy and imposing extremely severe duty on many of the working parts. At the end of every tenth hour throughout the trial was included a ten-minute period at full throttle take-off output. The powers obtained at the end of this endurance test were even higher than those reached in the type test.

Hercules of this type have been chosen for installation in the new class of Short flying boat for Imperial Airways. Developments in connection with the experimental 31-ton transport landplanes with Hercules engines, ordered by the Air Ministry, are also progressive.

British Extensions in Europe

IF the necessary negotiations are satisfactorily completed, British Airways will be starting three new European services on April 16. One of these has been mentioned, both in the House and by the Cadman Committee, as being desirable.

The first will be a weekday return service between Heston, Berlin and Warsaw. Lockheed 14s will be used, and with these machines Berlin will be reached in less than four hours and Warsaw in about six hours. The second will be a service between Heston, Frankfurt and Budapest, with one return journey each weekday. Lockheed 14s will again be used, bringing Frankfurt within 2½ hours and Budapest within six hours of Heston. On both these runs stewards will be carried and luncheon will be available. The third service will be one between Heston and Brussels, operated twice on weekdays in each direction. With Lockheed Electras, or 10As, the flying time between the two terminals will be 1½ hours.

The existing services between Heston, Hamburg, Copenhagen and Stockholm, and between Croydon, Cologne, Hanover and Berlin—the latter carrying the night mail and operated in conjunction with D.L.H.—will be continued as before.

It has already been announced that the Paris services will be run to a schedule of eight return journeys per day on weekdays and five on Sundays. In this case the service will be operated jointly by Imperial Airways and British Airways with D.H. Frobisher-class machines. Imperial Airways will duly be restarting their Zurich service, but will, of course, discontinue their present service to Brussels, Cologne and Frankfurt. The additional schedules will mean that the British airlines in Europe will, during the summer, be 2½ times their present length. Air mail will be carried unsurcharged on all the services except that returning from Hungary. The agreement with foreign companies will be reciprocal, though Poland and Hungary have not yet done anything under the agreement. The services to Berlin and Paris will be faster than those run by any other company.

British Airways' fleet at present consists of five Lockheed 10As, seven Lockheed 14s, and three Junkers Ju.52s. The last are used only on the night mail run. Lockheed 14s will be used on the West African service. When they receive the Fairey F.C.1 transports British Airways will have a majority of British machines. The development of this type is being handled by the Air Ministry. Two have previously been ordered and an order has recently been placed for twelve more of them. The prototype should be flying in 1940, and the type will be used for European services and not for the Atlantic. British Airways are also interested in the Short 14/28 landplane which has been ordered by the Air Ministry.

A Better Darwin

IN the course of the replanning of the Australian Darwin base for Air Force use, at a cost of about £900,000, a new flying-boat base will be provided, and the airport itself improved. At the same time a new hotel is to be built and the whole town is to be replanned.

Rodney Beresford

FLIGHT regrets to report the death of Flt. Lt. Rodney Beresford, seven months after a flying accident in Singapore. At that time Flt. Lt. Beresford had just gone out to Wearnes Air Services from Jersey Airways, and was flying a Praga lightweight at Singapore airport when the cabin roof accidentally opened and the machine went out of control. The fitting concerned has, of course, been duly modified in all later models.

Finnish Nationalisation?

WHILE the private Finnish company, Aero, is making good progress, the Government is discussing a scheme to nationalise air transport in Finland. A special commission under the chairmanship of Mr. Johan Roiha has recently reported, recommending the formation of a joint-stock company with a capital of 35 million Finnish marks, of which 21 millions are to be held by the Government. Municipalities and a limited number of private investors will be invited to subscribe the remainder.

The Commission states that further development of civil aviation in Finland will be impossible without some form of public subsidy, which, in the opinion of the Commission, justifies the socialisation of air transport. The new company would have the character of a civil aviation monopoly whose minimum operations would include the following regular services: Helsinki-Tallinn, Helsinki-Stockholm, Helsinki-Berlin, Helsinki-Uleaborg-Petsamo (on the White Sea Coast) via Tammerfors-Vasa-Kemi, and Helsinki-Viborg.

Airport to City Centre

EASTERN AIR LINES has recently given an order to the American Kellett Autogiro Corporation for a machine which will be used for connecting Central Airport, Camden, New Jersey, with the roof of the Philadelphia G.P.O., thus making it possible for the company to execute its mail contract.

In a general way this new Kellett Autogiro follows the lines of the military model which has already been supplied to the Air Corps, but will be a cabin single-seater with a large mail compartment. The type, which will be known as the K.D.-1B, will have a maximum speed of about 125 m.p.h. and a cruising speed of a little more than 100 m.p.h. The empty weight will be 1,630 lb. and the all-up weight 2,250 lb., while the machine will be powered with a Jacobs engine delivering 225 h.p. at 2,000 r.p.m. The rate of climb is given as 1,060ft./min. and the cruising range a matter of 200 miles; the distance between the airport and the Post Office is, in fact, only six miles.

For various reasons the civil types of Autogiro in the United States have all been of the straightforward type—similar to the original C.19 Autogiro in this country—and direct control, or wingless, machines have only been produced experimentally and for the Army Air Corps. This machine, therefore, will probably be the first direct-control Autogiro to be sold in America for civil purposes.

Jersey Traffic

SOME idea of the relative popularity of the three services which are operated in the winter months by Jersey Airways can be gathered from the February traffic figures. Between Jersey and Southampton in each direction a total of 426 passengers was carried, while between Jersey and London the figure was 167, and between Alderney and Jersey 18.

More German Machines for S.A.A.

APART from the purchase of two more Junkers Ju. 86s, which should have been delivered by now to South African Airways, this company will, in June, be taking over one of the two big Ju. 90s which they have ordered. When these machines have been delivered S.A.A. will have a fleet consisting of 30 Junkers, of which 17 will be Ju. 86s, 11 will be Ju. 52s and two will be Ju. 90s.

Air Comfort

LAST Friday, at a joint meeting of a score of transport and engineering associations and institutions, Capt. E. W. Percival read a special paper. This formed, in fact, the third section of a trio of papers under the general heading of "Comfort in Travel," the other two being devoted to road and rail problems.

Capt. Percival first briefly reviewed the history of air transport before attending in detail to the problems of silencing, ventilation, heating and general comfort of the passengers and crew. He explained how the methods of reducing noise and vibration, as applied to aeroplane construction, must of necessity differ from those used in the case of ground vehicles in which weight was not an important factor. Thereafter, he produced some very interesting facts to show the effects of noise on the human system. These effects, he said, were very largely reflex and, because they were uncontrollable, were therefore dangerous. Noise interfered with the human body because it caused what is known as a "fear reaction." It was, therefore, obviously an error to speak of "getting used" to noise. He described briefly how the sound-proofing problem was attacked, and stressed the importance of engine synchronisation in multi-engined machines.

Scientific investigations had also given the question of ventilation due prominence. Years ago on a certain section of an American air route, 60 per cent. of the passengers were invariably ill, whereas, since the use of machines with properly planned ventilation system, this figure had been reduced to 2 per cent. It was very much more effective to have a cabin correctly air-conditioned in large aircraft than to provide independent ventilation for the passengers. With the introduction of high-altitude operation the question of cabin heating had become more important, and Capt. Percival said that in America exhaust heating methods were now forbidden. The danger of the introduction of carbon monoxide through, say, a crack in the exhaust system was not apparent, however, if the heating element were placed far enough away from the engine.

Finally, Capt. Percival spoke more generally about the seating arrangements and the facilities provided for air travellers. In his conclusion he wondered that so little had been done to reduce the time taken to carry passengers between the aerodromes and the centre of the cities. He suggested the best way out of the difficulty would be to provide special elevated electric railways.

ANOTHER LIFTING FUSELAGE

THE idea of making the most, from the lift point of view, of the fuselage and other parts of the machine is a fairly old one. Just now, however, a machine is being developed at Heston in which the system is being carried one stage farther.

Mr. F. Helmy, who has already done one or two straights on the machine in question, has designed and built a low-wing, three-engined machine in which the fuselage has been designed to take a supplementary roof of aerofoil section which is, furthermore, adjustable to provide different characteristics in different circumstances. In the ordinary way the lifting section lies flush with the fuselage and is to all intents and purposes part of it, but if higher lift, during the approach and the landing or at any other time, is required, the leading edge is raised while the trailing edge is carried in runners which allow fore-and-aft movement. In order that the airflow over the tail surfaces shall not be affected, the section is so designed that there is ample flow of air beneath it.

The incidence of the fuselage-lifting section is such that it cannot be stalled, and the inventor's claim is that it will consequently act as a form of "sky-hook" when the somewhat diminutive cantilever low wing has, in effect, stalled.

With the idea of providing multi-engined safety, Mr. Helmy has fitted his experimental machine with three Aero Engine Sprite flat twins—one in the nose and two in the leading edge. Otherwise, this two-seater cabin machine is fairly conventional, though somewhat quaintly stubby in appearance. A new form of construction has been applied to the fuselage; in this, diagonally wound ply strips are used to take the stresses which would normally be taken by wire bracing or girders, and the fuselage is, consequently, a monocoque structure.

It remains to be seen whether the scheme is a reasonable one from the structural point of view. Apparently the N.P.L. at Teddington has commented favourably on the device from the aerodynamic standpoints, though the staff there have stated that it is mechanically impracticable. Since Mr. Helmy proposes to continue with his own flight-testing, though he has only 15 hours to his credit, we can only hope that the idea is a good one and that future test flights will be made with due care and caution. A series of straights at no particular height should be sufficient to prove the value of the scheme, and afterwards, more serious flying should be carried out by an experienced test pilot.

TOPICS of the DAY

Pride of Ownership

AFTER reading a few weeks ago in an American magazine that 600 (six hundred) little machines, the majority of them privately owned, flew to Miami last January without a single casualty, I cannot help wondering again what it is that prevents an increase in private ownership in this country. If a fleet of this magnitude were to attend any flying rally in this country it would be necessary for all the owners here to get their machines out of pawn.

Apart from weather difficulties and the fact that Europe is not quite so suited as the U.S. to flying by the amateur, it is still difficult to see exactly why more machines are not being bought. I have one pet theory which accounts for a good deal. Whereas the American pilot does not appear to mind flying a machine which is exactly similar to four or five hundred others, the amateur over here is peculiarly snobbish. If he buys an aeroplane he wants it to be different and better, and something of which to be proud. Otherwise, even if he can afford it, he goes without, and suffers the discomforts involved in hiring, begging or borrowing aeroplanes from different sources. Nobody really minds flying about in a somewhat bedraggled and ancient light aeroplane if this machine has only been hired or borrowed; one can always be jocularly disclaiming.

This theory would at least partly explain the failure of the very little aeroplanes to make much progress. If a prospective owner is ready to lay out several hundred pounds on a machine, he or she will probably find no difficulty in obtaining a few more hundreds with which to buy something better. Also, of course, only one or two of the very small machines have performances and capacities which would make them in any way useful for serious cross-country flying. If one is only going to tear round an aerodrome, or fly between two places not more than fifty miles apart, it is both cheaper and less worrying to make use of club machines.

It is significant that far more machines costing between £1,000 and £2,000 have been sold than those priced at £400 or under. Cheapness, as such, is apparently not wanted. The manufacturer who produces something really good and "different" round about the £1,000 mark would probably stand a much better chance of selling his machine than another who is offering a more or less similar, but very ordinary and uninteresting aeroplane, for £500. First cost, too, has little bearing on the matter, and the owner is much more afraid of high maintenance costs and, in particular, of being made, in a mild way, to look a fool. And one does look a fool if, after buying some strange but worthy machine for £300, the firm concerned goes out of business next week, leaving the owner with a doubtfully saleable flying machine of no particular merit.

Safety First

WHEN thinking in terms of cash it should also be remembered that most of the world's money is in the hands of people over the age of fifty. A machine which is to sell in quantity, therefore, must not only be different but also be extremely safe and easy to fly. If once the older generation can be encouraged to take this flying business seriously and not to treat it as a quick and unpleasant means to an end, the whole appearance of the aircraft market will change. And it is up to the manufacturers to produce something that is easy and safe, while, if necessary, continuing to make less easy, more manœuvrable and altogether more exciting aeroplanes (one at a time) for the younger generation.

As a proof of this constant demand for more safety, the case of the Autogiro type of machine can be given. The man in the steet still most firmly believes that the gyroplane will eventually arrive and that he will then be able to fly from one back garden to another. On the whole, the interest in the type has been out of all proportion to the number of such machines in existence at any single moment.

Luckily, development work on rotating wing aircraft continues, and the mythical man-in-the-street may yet see his ideals realised. In the meantime, the logical use of slots and flaps, and the application of the tricycle or level-landing type of undercarriage may help the cause.

Three weeks or so ago I had a chance of flying round in the prototype General Aircraft Cygnet, complete with tricycle undercarriage and twin fins and rudders. It is early yet to make any remarks about the machine as a machine, since it is still being used for test purposes and suffers the defects of a hack which is always being taken apart and put together again. In a month or so it will be a different story. But the important, or tricycle, part certainly works very well indeed.

Even to the comparatively experienced pilot, it is a great relief to be able to taxy furiously along the ground —well out of wind, if necessary—and to start flying merely by pulling mechanically on the control column. This flying need not be started until there is any amount of reserve speed.

During the landing one merely holds the machine off in a very haphazard sort of manner, and when the ground appears to be about where it should be and the speed down to, say, 60 m.p.h., the stick is just forgotten. If a landing is being made in a very small space the brake lever can be left in the full-on position during the approach and if, after all this, there is still a chance that the machine will run into the hedge, it can be turned more or less violently after it has settled down properly. The important points are that meticulous care need no longer be applied to this business of flying, while to the layman everything can become much more natural and normal—much less, in fact, like a tight-rope-walking act.

If landing ease is demanded first and foremost, it may not always even be necessary to go to the extent of fitting a three-wheel undercarriage. If the elevator control is limited and the undercarriage height and position arranged so that a still-air-borne landing can be made without the risk of ballooning, a good deal has been achieved. Such an arrangement applies to the Tipsy two-seater, and may reasonably be expected to reduce the pre-solo landing practice time by a third or even by a half.

Topics of the Day

False Security

FOR various reasons—at least in the present state of aerodynamic design—I have always been rather against the idea of encouraging the newcomer by making the inside of a cabin aeroplane as much like a car as possible. It is all very well to give the passengers a comfortable feeling of normality and security, but the pilot can very easily be lulled thereby into a sense of false security. He must, in fact, remember that, with all the beautiful upholstery, winding windows, car-type controls and handsome dashboard, his machine will still stall and spin like any stick and wire device of the old days.

The very lack of any sensation of motion or speed in an aeroplane is already liable to make people careless, and too great a degree of comfort merely accentuates this effect. When somebody has designed an aeroplane which not only sinks at the stall on a level keel, but can be landed normally in this attitude, and is completely viceless—then will be the time to provide central heating and home comforts. In the meantime it is as well to remember that one can still be spread like scrambled egg all over the car-type instrument board and handsome upholstery.

Some time ago I brought up the old question of parachutes and their relation to club flying. It is perfectly true that practically all such flying is carried out in circumstances in which a parachute would be virtually useless, that many light monoplanes cannot be disowned quickly in an emergency (least of all with a pack attached to one's person), and that parachutes, in any case, are somewhat expensive items of equipment—and until the arrival of the C.A.G. scheme I would never have seriously suggested their use for any but aerobatic flying.

Nowadays, however, the skies are becoming pretty full, and the risk of collision has, during the last six months, been markedly increased in the vicinity of some of the more important aerodromes. Usually the remarks of coroners can be ignored, but there was a good deal of sound common sense in those of the coroner at Nottingham who asked why the C.A.G. pupils were not provided with parachutes—presumably at Air Ministry expense. In this case such equipment would probably have saved a life, since two machines had collided in the air and one had gone down out of control. I know that whenever I am a party to formation flying—whether in Service machines or for photographic purposes—I am always very glad indeed of the comfortingly uncomfortable pressure of parachute harness. At least one has a second chance of life.

"INDICATOR."

First from the A.R.B.

THE Air Registration Board has passed its first prototype. This, interestingly enough, was the new General Aircraft Cygnet with a tricycle undercarriage, and the flight tests were made early last month by the A.R.B. pilots, Capt. H. F. Broad and Mr. Roland Falk. For the first time the new routine was followed, and the trials were conducted at the manufacturers' aerodrome—Hanworth, in this case—instead of Martlesham.

A Doncaster Party

MORE than 130 members and guests attended the annual ball of the Doncaster Aero Club, which was held on Tuesday, February 28. Among them were Lord Grimthorpe, who is a director of the club as well as chairman of North Eastern Airways, with Lady Grimthorpe, the Mayor and Mayoress of Doncaster, and other notabilities. Pleasantly contrary to the usual practice, there were no speeches after dinner.

Camps for the C.A.G.s

THE Commissioners of the C.A.G. have now approved a scheme for summer camps which are designed for the benefit of those members who, for one reason or another, cannot take their training during the normal working year. The first of these camps will be opened at High Post aerodrome on or about May 1.

Between this date and the end of October there will be twelve fortnightly flying courses, in each of which twenty candidates will be taken, and the Wiltshire School of Flying is making special arrangements to engage additional instructors and to obtain further machines. The camps will be run on very much the same lines as those of the Universities, and flying instruction will start at seven in the morning.

At the moment the Wiltshire School's fleet consists of four Moths, one Desoutter, and one Piper Cub; three Taylorcrafts are on order.

Weeding Them Out

LAST week the Civil Air Guard Commissioners stated that, to use their own words, "in view of the National Service campaign, they wish it to be known that only persons whose full-time services would be available as Civil Air Guard members in time of war are now eligible to join."

As it stands this statement is not, perhaps, as clear as it might be, but enquiries elicited the information that the "full-time service" conditions would be laid down by the National Service organisers. The words "full-time" mean that the eligible members must be fit for and capable of serving as pilots on active service, instructors, or pilots of necessary transport service. Those members who have already enrolled and who are not fit for such services will, of course, continue to be trained, but will not be allowed to regard the C.A.G. as their particular form of National Service. In time of emergency they would presumably be asked to take on other work.

A Manx Race Change

FOR the past three years the London-Isle of Man Air Race has included a compulsory stop for refuelling at Liverpool airport, but this year it has been decided to cut Speke out, though, for obvious safety reasons, the turning points at Blackpool and St. Bees Head will remain. Incidentally, the prize-money for the race is again being given by Mr. J. M. Cubbon.

Sixth Magyar

ONCE again the A.A. and the R.Ae.C. have been asked by the Hungarian Touring Club to assist in the organisation of the Magyar Pilota Picnic, which will be held this year from June 24 to June 29. This is the sixth of these flying outings, which are generally considered to be among the best and most unusual in the private flying calendar.

The programme this year involves an air tour of Hungary with a final two days in Budapest. Needless to say, all pilots and owners are invited to take part, and those who are interested should send their names either to the A.A. or the R.Ae.C. as soon as possible.

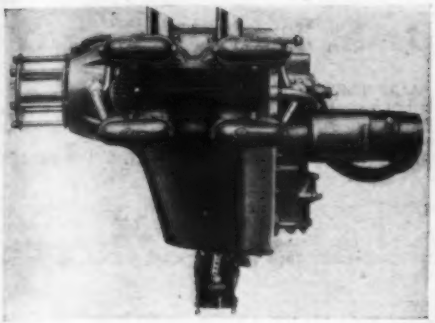
MILITARY AIRCRAFT of the WORLD

IN these days of ever-expanding air forces the little nations as well as the big ones are increasing their output of aircraft.

A means of viewing military aeroplanes of the world in their true perspective will be provided by *Flight* a fortnight hence, when a BRITISH AND FOREIGN MILITARY AIRCRAFT NUMBER will appear.

This issue will illustrate and give comprehensive data on the noteworthy machines of every aircraft-producing nation, thus forming a review that is both intrinsically interesting and useful as a work of reference; in addition, special articles will discuss armament and points of design having special reference to military requirements.

Thursday Week FLIGHT *March 30*



With its aerodynamically shaped crankcase and one-piece cylinder head the Praga D. flat-four engine is extremely clean. On the right it is shown installed in the latest version of the Praga E.114.

THE 1939 PRAGA LIGHTWEIGHTS

Improvements for the Smallest of the Praga Range : A Pusher Twin : The New Flat-four Engine

DURING the past year various minor but important changes have been made to the Praga E.114, or Baby, which was originally demonstrated in this country in 1936 and for which the manufacturing licence was obtained by F. Hills and Sons, Manchester. This lightweight was intended to offer as much as possible with the least initial expenditure by the club or the private owner, and the designer's aim has been to keep the layout as simple as possible. For those who require a rather higher performance and slightly greater comfort there is now the E.117, which, with one of the new flat-four Praga D. engines, cruises at 118 m.p.h. The increased performance has been largely obtained by a reduction of wing area, though the landing speed is still only 43 m.p.h., and by the application of such items as spats for the undercarriage. The cabin is slightly roomier and there is a door on each side.

In the 114, it will be remembered, the pilot and passenger, who are seated side by side, enter through the roof, which is in one piece with the leading edge and is hinged backwards at a point about one foot aft this edge, the joint being at the top of the windscreen. In the newer machine the arrangement is very similar, but the whole of the windscreen hinges back with the roof. This not only makes access rather easier, but it also permits a larger screen area and permits the fitting to be made adequately rainproof. One or two slight changes have been made to the tail design, and the fin and rudder area has been slightly increased.

Last week the company sent over a 114 with one of the flat-four engines for demonstration in this country. The additional power—40/45 to 60/80 h.p.—improves the performance, of course, but the main advantage of the extra 20 h.p. is in the take-off and initial climb. With two up the take-off requires a much shorter run and the rate of climb is equal to that of any normal light aeroplane. The landing speed is very slightly higher than before, but is still well below 40 m.p.h.

From the pilot's point of view probably the most important change has been in the ailerons. These are now of the Frise type, with back-set hinges and a leading edge balancing effect. With the original machine the aileron control, though effective right down to low speeds, was distinctly heavy at cruising speeds. The new ailerons are light throughout the speed range, though they are not, perhaps, quite as effective in the ordinary course of events. The most noticeable improvement which they offer is in the control at or near the stall. Little or no drag is apparent at 40 m.p.h., and control remains even when the stick is held right back and the machine is sinking in customary Praga manner at some unindicated speed below this figure.

From the stalling-characteristic point of view, the Praga Baby must be one of the safest small aeroplanes ever to be made. Without a violent pull-up the nose does not even drop and the machine simply remains on a level keel, while some aileron and rudder control remain.

Once one has become accustomed to the somewhat claustrophobic effect of the cabin—which, nevertheless, is quite roomy enough for two people of normal size—the only criticism which can justly be levelled at the machine is that its approach angle is flat in the extreme. Low price has been the primary aim of the makers, and the addition of any form of air brake or flap would increase this price. With its larger-sized rudder, however, the new 114 can be side-slipped quite effectively provided that the manœuvre is not attempted at too steep a lateral angle, and the machine will hold this slip without change of attitude at a speed of less than 60 m.p.h. Remembering the stalling characteristics, another justifiable means of losing height would be to hold the stick fairly well back and to let the machine sink more or less steadily towards the aerodrome boundary.

The new flat-four Praga D. is of a most interesting design. The Elektron crankcase has been aerodynamically shaped to fair into the forward part of the fuselage of the machine, while the cylinder heads and induction pipes have also been designed to reduce drag as far as possible. General cleanliness has been obtained by the installation inside the crankcase of the pressure oil-piping.

A single cylinder-head casting is used for each pair of cylinders, while the rocker chambers are cast in one piece with the head. There are two separate camshafts, one at the rear and one at the front of the engine, each operating two pairs of push-rods, the valves being axially disposed in the head. The four-throw crankshaft is a one-piece drop forging. The normal cruising power of the Praga D. engine is 60 h.p. with a maximum output of 79 h.p.

Very shortly we may see in this country one of the Praga E.210 twin-engined cabin machines. This interesting pusher design was originally shown at the Paris Exhibition two years ago, and in the meantime has been thoroughly tested and is now in production. The engines are Walter Minors of 85-95 h.p., which give the machine a maximum speed of 143 m.p.h. and a cruising speed of 130 m.p.h., with a useful load of 920 lb. As in the case of all Praga civil machines, it is a cantilever high-wing monoplane.

The Praga 114 is being sold in this country through Mr. W. Hauck, of 15-17, King Street, London, S.W.1, for approximately £450.

Long-distance Formation

DURING the past few years amateur and instructional pilots of the Bombay Flying Club have made a point of bringing a flight of machines over to this country during the bad weather season in India, and the trips carried out by these pilots have been the longest made by club members. Next year, the Royal Aero Club of New South Wales is planning to fly a formation of three Tiger Moths from Sydney to Birmingham, the idea being to time the arrival to coincide with the official opening of Elmdon airport.

FROM the CLUBS and SCHOOLS

LONDON.
FOR the week ended March 10 a total of 96 hr. 20 min. was flown. Mrs. W. Flack and Miss Y. Medlicott, together with Messrs. P. Lavender, R. G. Bruton, R. H. Grattan-Doyle and P. Fensom, finished the tests for their "A" licences. Mr. G. H. Westlake completed his instructor's course.

MARSHALL'S.
At Marshall's Flying School, 109 hr. 20 min. were flown during last week. Mr. Wellband made his first solo.

WITNEY AND OXFORD.
Flying times for March to the 11th were 32 hr. 55 min.; winds have been strong and have cut down flying considerably. Eight new C.A.G. *ab initio* pupils have started training.

NEWCASTLE-ON-TYNE.
Last week's flying totalled 48 hours, and 40 hours of this were contributed by the Civil Air Guard members. Mr. W. Miller made his first solo.

C.A.S.C.
A great improvement in the weather at Cambridge last week-end resulted in members flying 23 hr. 30 min. Mr. Anderson completed his "A" licence tests, and Mr. Hiscock made his first solo flight.

NORTH BRITISH.
There was no flying on one day because of high winds, but 16 hr. 15 min. were flown by C.A.G. members for the week ended March 10. For the previous week a total of 16 hr. 5 min. was logged.

THANET.
During the week ended March 7, in which three days were unsuitable for flying, 76½ hours were flown. Mr. J. T. Lean passed his "A" licence tests.

WESTON.
This club has suffered from the prevailing gales, but flew 39½ hours during the week ended March 7. Mr. H. Grimmer made his first solo flight.

REDHILL.
First solo flights by Messrs. G. R. Gimblett and W. E. Walford, and "A" licence tests completed by Messrs. P. C. V. Joslin and E. Salzman, were included in the flying total of 55 hr. 25 min. logged for the week ended March 11.

PORTSMOUTH.
Seventeen members have qualified for their "A" licences under the Civil Air Guard scheme at Portsmouth, and from March 1 to March 11 flying amounted to 39 hours in that section. In the club section over the same period 54 hours were flown.

YAPTON.
The total flying time by the club from March 1 to March 11 amounted to 12 hours, while the Civil Air Guard put in 41 hours. Five C.A.G. members have been successful with their "A" licence tests

DONCASTER.
Although high winds prevented instruction being given on five days of last week, Messrs. Arrand and Barraclough carried out their first solos on Friday last. Fourteen and a half hours' flying was put in during the period

EXETER.
High winds in the afternoons, occasionally accompanied by rain, have restricted flying activity. The total for the week ended March 7 was 35 hours. Messrs. E. T. Bradford and D. Blackmore made their first solo flights.

HERTS AND ESSEX
High winds were the cause in the drop in flying hours during the last fortnight—119 hr. 30 min. being logged. Mr. N. C. Cragg completed his "A" licence tests, while Messrs. W. Cramer, E. R. Cornish, J. Harrison, J. Haker, F. E. Johnson, S. H. Murray, C. Reeves, L. H Such, R. H. Walling and J. B. Walker have received their licences

CINQUE PORTS.
Two members of the Cinque Ports Flying Club left for a holiday in the South of France last week. Miss Joan Small obtained her "A" licence as a Civil Air Guard member, and Messrs. Paton and Thompson went solo. Flying for the week ended March 12 totalled 62 hours.

BARTON (BEDS).
A seventh machine has been added to the club fleet. Cross-country flights were made to Northampton and Chigwell last week and on Thursday Messrs. R A. Palmer, N. F. Jordan and N. P. Anson, with Miss Yvonne Newman and Miss Margery Grimmer, completed their "A" licence tests. A dance will be held on March 22.

BORDER.
Although club flying was only possible on 14 days during February 82 hr. 55 min. were logged for the month. Five members obtained their "A" licences and four others made first solos. Up to the 19th of this month flying has been very handicapped owing to the soft condition of the aerodrome surface.

PLYMOUTH AND DISTRICT.
The weather has recently been exceedingly bad. For the week ended March 7 a total of 36 hours were flown, and Mr. G. V. Dungey made his first solo flight. Nearly twenty pupils are waiting for a fine enough day to do their first solo flights or "A" licence tests.

IPSWICH.
The week ended March 7 was one of very bad weather with four days of gales, on which flying was impossible. The flying total of 54½ hours was a good one in the circumstances. Messrs. F. Wright and P. Cox have qualified for their "A" licences, and Mr. L. Hunter made his first solo

SOUTH COAST.
Five machines from the South Coast Club participated, with Brooklands, in a good-will flight to the Eastbourne Flying Club. Forty-seven hours' flying was put in last week, and Miss C. Mackenzie, Mrs. N. Haddock and Mr. I. Bowman qualified for their "A" licences as members of the Civil Air Guard. Mr. R. J. Smith, also C.A.G., made his first solo.

JOHANNESBURG.
During the year 1938 the flying total put in by the club was 7,264 hours, the highest number of hours for one month being 810. During January, 1939, a further total of 605 hours was flown. Messrs. A. Hoffman and J. A. Adam obtained their "A" licences, while Miss Findlay and Mr. G. Meyer made their first solos. Mr. P. E. Saunders, a former member, has joined the club as an instructor.

NORFOLK AND NORWICH.
Flying training continued smoothly last week and Mr. L. D. Alston completed his "A" licence tests. In the gliding section, Mr. H. H. Hipperson qualified to fly the H.17, and the Baron de Sarigny attained a height of 1,400ft. in this machine from a car tow. He prolonged his flight sufficiently to enable him to give a display of aerobatics. The date of the annual dance has been changed to Friday, April 21, owing to coincidence of the original date with the Easter holidays.

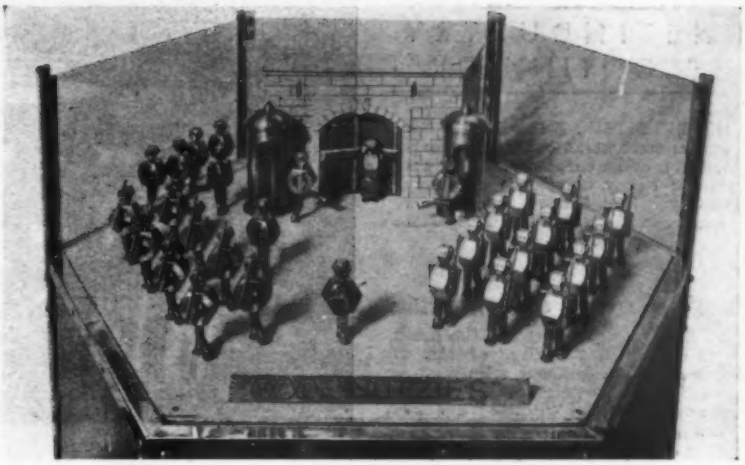
YORKSHIRE.
The total flying for March up to the 12th was 99 hours. Seventy-three hours were put in last week, although it was only possible to fly on two days. Several trips were made to take photographs of a trawler which sank in the River Humber.
In the C.A.G. section Miss S. McKay and Mr. A. O. Mell made their first solos. During February the club flew a total of 257 hr. 10 min.—a figure which sets a record for any winter month in the club's history.

ROMFORD.
Gusty weather kept the machines in their hangars on the first three days of last week, and similarly unfavourable weather conditions for the remainder of the week permitted only thirty hours' flying. Miss J. Weeks qualified for her "A" licence, and Mr. Forsyth went solo.
No. 6 (Romford) Squadron of the Air Defence Cadet Corps are, during this week, making a special appeal for assistance at a local cinema, where a flying film is being shown. An attempt is being made to introduce a different speaker each evening.

WEST SUFFOLK.
Good progress is reported from the West Suffolk Aero Club at Bury St. Edmund's aerodrome. During the six weeks to March 12 enrolments have amounted to 30 club members and 45 C.A.G.s. Messrs. R. A. Haylock, R. W. Hubbert, V. T. Faiers, W. W. Hearne, H. England, C. B. Bailey-Watson, and T. Q. Osburne made their first solos. Mr. R A. Haylock and Mr. T. Q. Osburne have now qualified for their "A" licences. For the six weeks a total flying time of 140 hours has been recorded. A C.A.G. dance was held on February 16.

BROOKLANDS.
On Sunday last ten pilots flew machines to Wilmington, where they were joined by five pilots from the South Coast Flying Club at Shoreham for lunch at the Eastbourne Flying Club. In the afternoon there was a parade of No. 11 Squadron of the Air Defence Cadet Corps. Ten cadets were taken for flights by Capt. Duncan Davis and Flt. Lt. John Grierson, these flights being awarded to the cadets who have produced the best essays on "Why I joined the Air Defence Cadet Corps." A handicap landing competition has been fixed for Sunday next. Ninety-one hours were flown last week, during which Messrs. E. Ferguson and A. Newman went solo.

GRIMSBY.
Although flying has been restricted by bad weather during the past two months at Waltham, Lincolnshire, ten C.A.G. members of the Grimsby Aero Club obtained their "A" licences in the period, and, additionally, seven made their first solo flights. The "A" licencees were Messrs. E. L. Galley, A. G. Zealand, G. W. Milson, A. J. Curley, A. Hopwood, H. Windle, A. L. Greenacre, S. Pigott, C. Mumby and J. Hawkins; the first soloists were Mrs. Michelmore, Messrs. J. W. Middleton, S. M. Beall, R. L. North, L. Berman, G. Hipkin and J. B. Fenwick. The Grimsby Aero Club is under the control of Grimsby Aviation, Ltd., of which the directors are the three Frogley brothers, with Mr. F. E. Darlow, well-known at the Herts and Essex Club, as secretary. Mr. Roger Frogley is in charge of the flying, and Mr. Michelmore is the chief instructor.



THE "NUTZIES" on parade—an amusing yet informative piece of display-craft on the British Industries Fair stand of M.C.L. and Repetition, Ltd.

THE INDUSTRY

Important Rolls-Royce Appointments

TWO appointments which will be received with acclamation by the aircraft industry have recently taken place at Derby. Mr. H. J. Swift, who has been with the Rolls-Royce firm since the very early days, has been appointed general manager of aero engine production, and will, in that capacity, be in charge not only at the Derby works but will also be responsible for the new R.-R. factory at Crewe. No one who has followed Mr. Swift's work hitherto will have any doubts that aero engine production will be in the best possible hands.

The other appointment is really a reappointment. Lt. Col. L. F. R. Fell joined Rolls-Royce, Ltd., in 1928, after relinquishing his Air Ministry position of Assistant Director (Engines). He left the firm in 1934 to take up the post of chief engineer of Armstrong Siddeley's aero engine department, and now he has returned to the Derby fold.

At the Sign of the Hand and Spring

OVER one hundred and fifty million springs, ranging from high-grade aero valve springs to the humble door lock variety, are, it is claimed, produced each year at the Redditch factory of Herbert Terry and Sons, Ltd. Colossal as this figure appears, it forms only a part of the company's total annual production, for springs are but one of the many products in which it is interested.

Quite recently we were able to see for ourselves the extraordinary variety of the work undertaken at the Redditch factory. Following in the slipstream of Mr. John Darby, the sales manager, we were conducted through the various shops, process rooms and stores, stopping only for tea served in what must be one of the finest canteen-cum-lecture halls in the Midlands. Here shifts of over two hundred employees can be served with meals in the absolute minimum of time.

The factory, which covers several acres, is arranged with such orderliness that it is difficult to realise that it has been extended and added to over a period of many years; the modern layout appears to have been designed as a whole.

In special controlled-temperature cellars hundreds of tons of steel wire of all gauges are stored. Nearby is the research department, equipped with apparatus for conducting the various tension, torsion and other tests necessary to ensure the high standards which are demanded in the finished products.

In the main, the production of springs is confined to the older parts of the factory. Highly specialised automatics are employed. Here, also, are situated presses, for presswork forms a large part of the aircraft work undertaken by Herbert Terry and Sons. Clips, brackets, cases, small tools, race cages—all find their origin in these shops.

Across the road are the most recent additions to the factory. Here is the spacious machine shop in which all types of precision work is carried out on batteries of capstans, automatics, etc. This, too, is the shop where the Anglepoise lamps are made; this type of lamp forms a by no means unimportant part of the chartroom equipment in Short Sunderlands.

But to make any serious attempt at describing in detail the thousand-and-one different articles manufactured by Herbert Terry and Sons would be impossible except in book form. In fact, even Mr. Darby, with all his expert conjuring ability to make thimbles and cigarettes disappear, cannot dismiss the subject in catalogue form in less than a hundred pages!

"The Aircraft Engineer" Next Week

IN view of the fact that the issue of *Flight* dated March 30 will contain a series of special articles on world trends in military aircraft development, *The Aircraft Engineer* monthly technical supplement to *Flight* will be published in next week's issue, one week earlier than usual.

Insurance Expansion

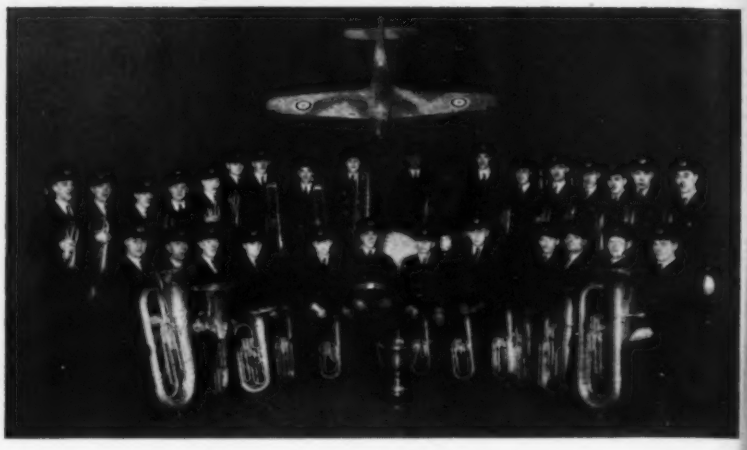
ALTHOUGH R.A.F. and Fleet Air Arm expansion has affected the British Aviation Insurance Co. only to a small extent, expansion in other directions has been considerable, and the company has taken further accommodation in Lloyd's Building in Lime Street, London, E.C.3.

It is also announced that Mr. Jacques Lorentz, who was with the Pratt and Whitney Co. in the United States and with Junkers in Germany, has been appointed technical representative in South Africa, while a similar appointment will shortly be made in Australia. The company already has direct representation in Canada and the United States.

Recently Mr. E. V. Rutter, of the Phœnix Assurance Co., was appointed secretary of the company. Captain A. G. Lamplugh remains underwriter and principal surveyor.

GYRO REPAIR SCHOOL: The repair of gyroscopic instruments is a specialised branch of aircraft instrument maintenance, and cannot be undertaken by ordinary instrument repairers without individual training and tool equipment. Seen above is the interior of the repair school which the Sperry Gyroscope Co., Ltd., has opened at its Great West Road (Brentford, Middlesex) factory. A six-weeks' course should give proficiency in Artificial Horizon and Directional Gyro work; another two to four weeks is needed for the Gyropilot. The service is given free by the Sperry Co. to approved employees of aircraft operators using its equipment.

THE INDUSTRY (CONTINUED)



IN FINE PITCH: Believed to be the first aircraft works band, this smart-looking outfit consists of employees of the Fairey Company's Stockport factory. Last Sunday they gave a concert in the B.B.C. North Regional programme.

Death of Mr. N. Cowtan Hatton

FLIGHT regrets to record the death, after a short illness, of Mr. N. Cowtan Hatton, assistant sales manager of the B.B. Chemical Co., Ltd., of Leicester, makers of "Bostik" adhesives and sealing compounds.

Aircraft Chains

RECENTLY, in our report of the Birmingham section of the British Industries Fair, we commented on the appearance of chain, made by Perry and Co., Ltd., of Tyseley, Birmingham, specially for service in aircraft, the most obvious application being in connection with controls. This chain is being produced both in standard and in 18-8 austenitic stainless steel, one inherent advantage of which is that it is non-magnetic. Dimensions and characteristics of nine sizes of chain now being produced are given in a newly published booklet.

Representing America

SOME twenty American aircraft equipment manufacturers are now represented in this country by Aviation Corporates, Ltd., of 50, Pall Mall, London, S.W.1 (Abbey 5505).

Their products cover a very wide range, including, to mention a few items, A.G.S. parts, instruments, finishes, fabric, auxiliary power units, floats, landing lights, fuel pumps, hydraulic equipment and sheet-metal-working machinery.

Mr. John M. Millar tells us that Aviation Corporates are also representing the Cessna Aeroplane Co. with the Airmaster and the new twin-engined Cessna, which will be offered with Gipsy Six engines and D.H. airscrews as optional equipment. They also represent the Spartan Aeroplane Co., of Tulsa, Oklahoma.

Easy Degreasing

SOME simple and portable degreasing equipment is now being produced by Celtis, Ltd., of Welwyn Garden City, Herts, and it is stated that it is being used in considerable quantities in the aircraft and other industries.

The apparatus is designed for use in conjunction with the company's degreasing compound known as "Uniclen." It consists of a steel galvanised tank holding approximately 40 gallons and heated by gas with thermostatic control. A separate tray for holding the parts to be degreased fits within the tank and drops to within one inch of the bottom. The whole unit is mounted on wheels. Including 1cwt. of degreasing compound, the price of the unit is £17 10s.

To judge by a small sample which we have tested, the compound is very effective when used, as it should be, with hot water. The maker's chief claim is that no sludge falls to the bottom of the tank; grease and dirt rises to form a surface film which can easily be skimmed off.

NEW COMPANIES

ASSOCIATED AIR DEVELOPMENTS CO., LTD.—Private company, registered January 30. Capital, £100 in 100 shares of £1 each. Objects: To carry on the business of manufacturers of spray plants of all kinds, particularly those plants suitable for the woodworking, steel and allied industries, etc. The first directors are to be appointed by the subscribers. Solicitors: Manches & Co., 4, Broad Street Place, London, E.C.2.

BRITAIR LTD.—Private company, registered February 17. Capital, £2,000 in 2,000 shares of £1 each. Objects:—To carry on the business of manufacturers of and dealers in all forms of aeronautical, automobile and technical materials, accessories and components and all forms of aircraft, motor vehicles and necessities appertaining thereto. The first directors are not named.

THE LAYCOCK ENGINEERING CO., LTD., was registered as a private company on February 1, with a nominal capital of £100 in 100 shares of £1 each. The objects are: To acquire from Birfield Industries Limited all or part of the undertaking and assets of the business carried on by Laycock Holdings, Ltd. (formerly known as the Laycock Engineering Co., Ltd.), and to discharge all or part of the liabilities of the said business; and to carry on the business of manufacturers of automobile, aircraft, aero engine, railway and steamship equipment and parts or components thereof, and fittings and accessories thereto, mechanical, electrical, marine and motor and aircraft engineers, etc. The first directors are not named. Solicitors: Linklaters & Paines, 2, Bond Court, London, E.C.4, and Roland Hollick & Co., 97, Little Park Street, Coventry.

NIGHT AIR TRANSPORT, LTD.—Private company, registered in Edinburgh on February 22. Capital, £100 in £1 shares. Objects: To establish, maintain and work lines of aerial conveyances, either by night or day, between any place or places in Scotland and England or elsewhere. The directors are: William A. Scott Douglas and David F. McIntyre. Registered office: 3, Glenfeulas Street, Edinburgh.

AERONAUTICAL AND INDUSTRIAL SERVICES (SOUTHAMPTON), LTD.—Private company, registered February 20. Capital, £1,000 in 2,000 ordinary shares of 1s. and 3,600 5 per cent. participating preference shares of 5s. Objects: To acquire the business of Merriams Aviation Bureau, carried on by Fdk. W. Merriam and Brian K. D. Robertson at 194, Above Bar, Southampton, and to carry on the business of consultants, advisers and financiers to the trades of manufacturing, engineering, aviation and shipping, etc. The directors are: Fdk. W. Merriam, Brian K. D. Robertson, Edgar B. H. Hall and Robert F. Graham. Registered office: 194, Above Bar, Southampton.

LANCASTER, MORECAMBE AND DISTRICT AERO CLUB, LTD.—Public company, registered February 28. Capital, £1,000 in 1,000 ordinary shares of £1 each. Objects: to establish and maintain a club to afford members facilities for flying, etc. The directors are: Wilfred J. Neild, Francis de Thier, James Caunt, William S. Lee, Henry S. Duxbury, Eric Meadows and Leonard E. Falla.

BRITISH AERO LUBRICANTS, LTD.—Private company, registered February 27. Capital, £1,000 in 1,000 ordinary shares of £1 each. Objects: to carry on the business of fuel engineers and experts, particularly in relation to oil fuel, etc. The directors are: Hyman Yudt and Peter F. Whitwell. Registered office: Norfolk House, Laurence Pountney Hill, London, E.C.4.

WING AIRCRAFT AND INSTRUMENT CO., LTD.—Private company, registered March 2. Capital, £100 in 2,000 shares of 1s. each. Objects: To carry on the business of manufacturers, importers and exporters of and dealers in all kinds of aircraft machines, motors, components and accessories, optical instruments, lenses, components and accessories, etc. The directors are: Chas. H. Parker (civil engineer) and John P. Smillie (audit clerk). Registered office: 52/3, Cheapside, London, E.C.2.

INNER CIRCLE AIR LINES, LTD.—Private company, registered March 2. Capital, £100 in 100 shares of £1 each. Objects: To establish, maintain and work lines of aerial conveyances, etc. The directors are: Mildred M. Bruce and Eric E. Noddings (both directors of Air Dispatch, Ltd.). Registered office: Air Port of London, Croydon, Surrey.

HORSHAM & SUSSEX FLYING CLUB, LTD.—Private company, registered March 3. Capital, £100 in £1 shares. Objects: To carry on a flying club, etc. The first directors are to be appointed by the subscribers. Solicitors: Hugh V. Harraway & Son, 2, Field Court, Gray's Inn, London, W.C.1.

AVIATION CHARTER, LTD.—Private company, registered March 4. Capital, £300 in 200 7 per cent. participating cumulative preference and 100 ordinary shares of £1 each. Objects: To carry on the business of charterers and hirers of aeroplanes, etc. The directors are: Raphael C. Preston (civil air pilot); F/O. Lord Malcolm Douglas-Hamilton, R.A.F.O.; Edward G. H. Forsyth (director of Forsyth & Partners, Ltd.); and Ivy B. M. Forsyth. Registered office: 85, Gracechurch Street, London, E.C.3.

AERONAUTICAL PATENT SPECIFICATIONS

(The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

(*Published February* 23, 1939.)

20546. AIRCRAFT COMPONENTS, LTD., and BOUND, R.H.: Locking and operation of retractable parts of aircraft (499,500).

20950. HART, R. P.: Parachutes (499,409).

21016. TAMPIER, R.: Means for controlling the moving surfaces of aircraft (499,833).

21015. TAMPIER, R.: Hinge mechanism for moving or control surfaces of aircraft (499,503).

23833. MATTEUCCI, R.: Variable-pitch propellers (499,514).

25162. CHANCE BROS. & CO., LTD., and HALLETT, L. B. H.: Fluid-pressure-operated electric relays (499,517).

25306. BRITISH THOMSON-HOUSTON CO., LTD., and ROE, E. W.: Variable-pitch screw propellers (499,518).

27437. EVERSHED AND VIGNOLES, LTD., and SHORT, W. J.: Indicating-apparatus for use in gun-control (499,523).

33817. LORENZ AKT.-GES., C.: Radio antenna systems (499,684).

8677. AEROPLANI CAPRONI SOC. ANON.: Apparatus for driving co-axial propellers in opposite directions (499,622).

9400. FAIRWEATHER, W. C. (Arado Flugzeugwerke Ges.): Sighting devices for guns (499,555).

11470. HAMMOND, E. V.: Aircraft designed to facilitate take-off and landing (499,632).

11543. TRIGGS, W. W. (Argus Motoren Ges.): Regulatable screw propeller having adjustable blades (499,634).

16704. SPERRY PRODUCTS, INC., and STEVENS, A. H.: Attitude-of-flight indicators (499,639).

22021. RHEINMETALL-BORSIG AKT.-GES., and GIETMANN, A.: Ward, Leonard drive, especially for driving the elevating and traversing mechanisms for guns or the traversing mechanisms of gun turrets (499,737).

33205. CRANE, C. J., and NESBITT, F. G.: Indicating instrument more especially for aircraft (499,811).